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AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

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VOLUME 25 NUMBER 7 / APRIL 8, 1987

TABLE OF CONTENTS

AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics.*

01 AERONAUTICS (GENERAL) 857

02 AERODYNAMICS 859

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*

03 AIR TRANSPORTATION AND SAFETY 863

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION 864

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Space Communications, Spacecraft Communications, Command and Tracking* and *32 Communications and Radar.*

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE 864

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.* For land transportation vehicles see *85 Urban Technology and Transportation.*

06 AIRCRAFT INSTRUMENTATION N.A.

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

07 AIRCRAFT PROPULSION AND POWER 866

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and onboard auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

08 AIRCRAFT STABILITY AND CONTROL 870

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

For related information see also *05 Aircraft Design, Testing and Performance.*

09 RESEARCH AND SUPPORT FACILITIES (AIR) 870

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tubes; and aircraft engine test stands.

For related information see also *14 Ground Support Systems and Facilities (Space).*

ASTRONAUTICS

Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; space communications, spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*

12 ASTRONAUTICS (GENERAL) 871

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

13 ASTRODYNAMICS N.A.

Includes powered and free-flight trajectories; and orbital and launching dynamics.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE) 873

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research and Support Facilities (Air).*

15 LAUNCH VEHICLES AND SPACE VEHICLES 873

Includes boosters; operating problems of launch/space vehicle systems; and reusable vehicles.

For related information see also *20 Spacecraft Propulsion and Power.*

16 SPACE TRANSPORTATION 874

Includes passenger and cargo space transportation, e.g., shuttle operations; and space rescue techniques.

For related information see also *03 Air Transportation and Safety* and *18 Spacecraft Design, Testing and Performance.* For space suits see *54 Man/System Technology and Life Support.*

17 SPACE COMMUNICATIONS, SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING N.A.

Includes telemetry; space communications networks; astronavigation and guidance; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications and Radar.*

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE 874

Includes satellites; space platforms; space stations; spacecraft systems and components such as thermal and environmental controls; and attitude controls.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance, 39 Structural Mechanics,* and *16 Space Transportation.*

19 SPACECRAFT INSTRUMENTATION 876

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

20 SPACECRAFT PROPULSION AND POWER 876

Includes main propulsion systems and components, e.g. rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels, 44 Energy Production and Conversion,* and *15 Launch Vehicles and Space Vehicles.*

CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; propellants and fuels; and materials processing.

23 CHEMISTRY AND MATERIALS (GENERAL) 877

24 COMPOSITE MATERIALS 878

Includes physical, chemical, and mechanical properties of laminates and other composite materials.

For ceramic materials see *27 Nonmetallic Materials.*

25 INORGANIC AND PHYSICAL CHEMISTRY 879

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

26 METALLIC MATERIALS 880

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

27 NONMETALLIC MATERIALS 882

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

For composite materials see *24 Composite Materials.*

28 PROPELLANTS AND FUELS 884

Includes rocket propellants, igniters and oxidizers; their storage and handling procedures; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

29 MATERIALS PROCESSING 885

Includes space-based development of products and processes for commercial application.

For biological materials see *55 Space Biology.*

ENGINEERING

Includes engineering (general); communications and radar; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.

For related information see also *Physics.*

31 ENGINEERING (GENERAL) 885

Includes vacuum technology; control engineering; display engineering; cryogenics; and fire prevention.

32 COMMUNICATIONS AND RADAR 886

Includes radar; land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Space Communications, Spacecraft Communications, Command and Tracking.* For search and rescue see *03 Air Transportation and Safety,* and *16 Space Transportation.*

33 ELECTRONICS AND ELECTRICAL ENGINEERING 898

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

34 FLUID MECHANICS AND HEAT TRANSFER 902

Includes boundary layers; hydrodynamics; fluidics; mass transfer and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

35 INSTRUMENTATION AND PHOTOGRAPHY 905

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources and Remote Sensing.* For related information see also *06 Aircraft Instrumentation* and *19 Spacecraft Instrumentation.*

36 LASERS AND MASERS 906

Includes parametric amplifiers.

For related information see also *76 Solid-State Physics.*

37 MECHANICAL ENGINEERING 908

Includes auxiliary systems (nonpower); machine elements and processes; and mechanical equipment.

38 QUALITY ASSURANCE AND RELIABILITY 909

Includes product sampling procedures and techniques; and quality control.

39 STRUCTURAL MECHANICS 910

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

GEOSCIENCES

Includes geosciences (general); earth resources and remote sensing; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.

For related information see also *Space Sciences.*

42 GEOSCIENCES (GENERAL) **N.A.**

43 EARTH RESOURCES AND REMOTE SENSING **913**

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

44 ENERGY PRODUCTION AND CONVERSION **920**

Includes specific energy conversion systems, e.g., fuel cells; global sources of energy; geophysical conversion; and windpower.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *28 Propellants and Fuels.*

45 ENVIRONMENT POLLUTION **920**

Includes atmospheric, noise, thermal, and water pollution.

46 GEOPHYSICS **921**

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

47 METEOROLOGY AND CLIMATOLOGY **942**

Includes weather forecasting and modification.

48 OCEANOGRAPHY **944**

Includes biological, dynamic, and physical oceanography; and marine resources.

For related information see also *43 Earth Resources and Remote Sensing.*

LIFE SCIENCES

Includes life sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and space biology.

51 LIFE SCIENCES (GENERAL) **944**

52 AEROSPACE MEDICINE **945**

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

53 BEHAVIORAL SCIENCES **947**

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT **948**

Includes human engineering; biotechnology; and space suits and protective clothing.

For related information see also *16 Space Transportation.*

55 SPACE BIOLOGY **N.A.**

Includes exobiology; planetary biology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL) **N.A.**

60 COMPUTER OPERATIONS AND HARDWARE **949**

Includes hardware for computer graphics, firmware, and data processing.

For components see *33 Electronics and Electrical Engineering.*

61 COMPUTER PROGRAMMING AND SOFTWARE **949**

Includes computer programs, routines, algorithms, and specific applications, e.g., CAD/CAM.

62 COMPUTER SYSTEMS **954**

Includes computer networks and special application computer systems.

63 CYBERNETICS **954**

Includes feedback and control theory, artificial intelligence, robotics and expert systems.

For related information see also *54 Man/System Technology and Life Support.*

64 NUMERICAL ANALYSIS **955**

Includes iteration, difference equations, and numerical approximation.

65 STATISTICS AND PROBABILITY **956**

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

66 SYSTEMS ANALYSIS **N.A.**

Includes mathematical modeling; network analysis; and operations research.

67 THEORETICAL MATHEMATICS **N.A.**

Includes topology and number theory.

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Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.

For related information see also *Engineering.*

70 PHYSICS (GENERAL) **957**

For precision time and time interval (PTTI) see *35 Instrumentation and Photography;* for geophysics, astrophysics or solar physics see *46 Geophysics, 90 Astrophysics,* or *92 Solar Physics.*

71 ACOUSTICS 960
Includes sound generation, transmission, and attenuation.
For noise pollution see *45 Environment Pollution.*

72 ATOMIC AND MOLECULAR PHYSICS 960
Includes atomic structure, electron properties, and molecular spectra.

73 NUCLEAR AND HIGH-ENERGY PHYSICS 961
Includes elementary and nuclear particles; and reactor theory.
For space radiation see *93 Space Radiation.*

74 OPTICS 961
Includes light phenomena and optical devices.
For lasers see *36 Lasers and Masers.*

75 PLASMA PHYSICS 963
Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics.* For space plasmas see *90 Astrophysics.*

76 SOLID-STATE PHYSICS 975
Includes superconductivity.
For related information see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

77 THERMODYNAMICS AND STATISTICAL PHYSICS 977
Includes quantum mechanics; theoretical physics; and Bose and Fermi statistics.
For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law, political science, and space policy; and urban technology and transportation.

80 SOCIAL SCIENCES (GENERAL) N.A.
Includes educational matters.

81 ADMINISTRATION AND MANAGEMENT 978
Includes management planning and research.

82 DOCUMENTATION AND INFORMATION SCIENCE 978
Includes information management; information storage and retrieval technology; technical writing; graphic arts; and micrography.
For computer documentation see *61 Computer Programming and Software.*

83 ECONOMICS AND COST ANALYSIS N.A.
Includes cost effectiveness studies.

84 LAW, POLITICAL SCIENCE AND SPACE POLICY 979
Includes NASA appropriation hearings; aviation law; space law and policy; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION 979
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) N.A.

89 ASTRONOMY 980
Includes radio, gamma-ray, and infrared astronomy; and astrometry.

90 ASTROPHYSICS 981
Includes cosmology; celestial mechanics; space plasmas; and interstellar and interplanetary gases and dust.
For related information see also *75 Plasma Physics.*

91 LUNAR AND PLANETARY EXPLORATION 984
Includes planetology; and manned and unmanned flights.
For spacecraft design or space stations see *18 Spacecraft Design, Testing and Performance.*

92 SOLAR PHYSICS 985
Includes solar activity, solar flares, solar radiation and sunspots.
For related information see *93 Space Radiation.*

93 SPACE RADIATION 986
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

GENERAL

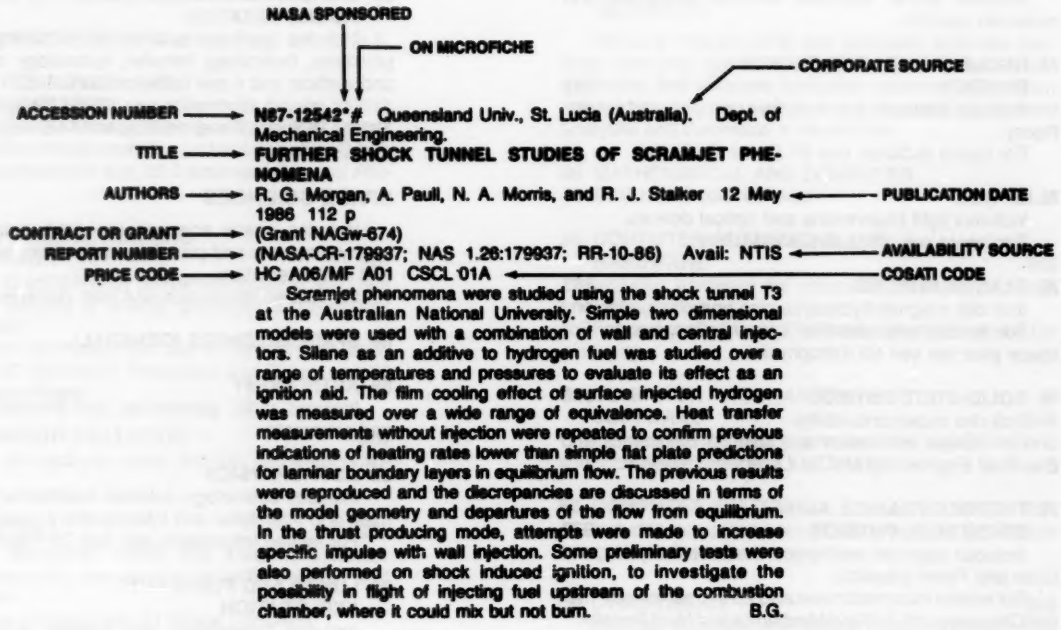
Includes aeronautical, astronautical, and space science related histories, biographies, and pertinent reports too broad for categorization; histories or broad overviews of NASA programs.

99 GENERAL N.A.

Note: N.A. means that no abstracts were assigned to this category for this issue.

SUBJECT INDEX I-1
PERSONAL AUTHOR INDEX I-45
CORPORATE SOURCE INDEX I-51
CONTRACT NUMBER INDEX I-61
REPORT/ACCESSION NUMBER INDEX I-63

TYPICAL CITATION AND ABSTRACT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ACCESSION NUMBER
N87-12542*# Queensland Univ., St. Lucia (Australia). Dept. of Mechanical Engineering.
TITLE
FURTHER SHOCK TUNNEL STUDIES OF SCRAMJET PHENOMENA
AUTHORS
R. G. Morgan, A. Paull, N. A. Morris, and R. J. Stalker 12 May 1986 112 p
PUBLICATION DATE
CONTRACT OR GRANT
(Grant NAGw-674)
REPORT NUMBER
(NASA-CR-179937; NAS 1.26:179937; RR-10-86) Avail: NTIS
AVAILABILITY SOURCE
PRICE CODE
HC A06/MF A01 CSCL 01A
COSATI CODE
Scramjet phenomena were studied using the shock tunnel T3 at the Australian National University. Simple two dimensional models were used with a combination of wall and central injectors. Silane as an additive to hydrogen fuel was studied over a range of temperatures and pressures to evaluate its effect as an ignition aid. The film cooling effect of surface injected hydrogen was measured over a wide range of equivalence. Heat transfer measurements without injection were repeated to confirm previous indications of heating rates lower than simple flat plate predictions for laminar boundary layers in equilibrium flow. The previous results were reproduced and the discrepancies are discussed in terms of the model geometry and departures of the flow from equilibrium. In the thrust producing mode, attempts were made to increase specific impulse with wall injection. Some preliminary tests were also performed on shock induced ignition, to investigate the possibility in flight of injecting fuel upstream of the combustion chamber, where it could mix but not burn. B.G.

VOLUME 25 NUMBER 7 / APRIL 8, 1987

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N87-15160# European Space Agency, Paris (France).
BOUNDARY LAYER CONTROL BY TRANSITION FIXING
Oct. 1985 146 p Transl. into ENGLISH of "Grenzschichtsteuerung durch Transitionsfixierung", DFVLR, Goettingen, West Germany, Report DFVLR-Mitt-86-17, 17 Sep. 1984 145 p Proceedings of the DGLR Scientific Committee on Measurement and Testing Techniques in Fluid Dynamics and Thermodynamics, Berlin, West Germany, 24-25 Nov. 1983 Original language document previously announced as N85-23712
(ESA-TT-909; DFVLR-Mitt-84-17; ETN-87-98813) Avail: NTIS HC A07/MF A01; original German version available from DFVLR, Cologne, West Germany DM 39

Application of wind tunnel results to aerodynamic performance of large aircraft is treated. Boundary layer transition control for takeoff and landing configurations; transition fixing for transonic transport-type aircraft configurations; transition fixing in the high speed range for the development of civil aircraft wings; and transition fixing on wings in industrial wind tunnels are discussed. The influence of transition strips on the pressure distribution on transonic profiles; and the development of an artificial boundary layer for different outlet flows are presented. The conditions for tripping transition with roughness elements and their influence on boundary layer development are discussed. Transition fixing and simulation of high Reynolds number flow at transonic velocities are treated. Transition detection using surface pressure holes, and the detection of boundary layer transitions by wall shear stress and wall pressure fluctuation measurements are discussed. For individual titles, see N87-15161 through N87-15171.

N87-15161# Messerschmitt-Boelkow-Blohm G.m.b.H., Bremen (West Germany). Unternehmensbereich Transport-und Verkehrsflugzeuge.
PROBLEMS OF THE APPLICATION OF WIND TUNNEL RESULTS TO AERODYNAMIC PERFORMANCE OF LARGE AIRCRAFT c05
R. Hilbig *In* ESA Boundary Layer Control by Transition Fixing (ESA-TT-909) Oct. 1985 p 7-16 Transl. into ENGLISH from "Grenzxchichtsteverung durch Transitionsfixierung" rept. DFVLR-Mitt-84-17 DFVLR, Goettingen, West Germany, Sep. 1984 Original language document was announced as N85-23713 (For primary document see N87-15160 07-01)
Avail: NTIS HC A07/MF A01; original German version available from DFVLR, Cologne, West Germany DM 39

The utilization of unambiguous, reproducible wind tunnel results as a basis for the prediction of large aircraft performances and properties under flight conditions is discussed. It is shown that unambiguous wind tunnel results are absolutely required in the different aircraft development phases. This unambiguity is only possible with a transition fixing which is demonstrated to be laminar-turbulent. The boundary layer falsification by size and position and the fixing measures have to be minimized. This leads to requirements for the minimum Reynolds number domain that has to be reached in the wind tunnel. Additional experimental information about the boundary layer development under three-dimensional conditions and about the blow-away field are necessary to improve the numerical-experimental method to apply wind tunnel results to flight conditions. ESA

N87-15162# Messerschmitt-Boelkow-Blohm G.m.b.H., Bremen (West Germany). Unternehmensbereich Transport-und Verkehrsflugzeug
BOUNDARY LAYER TRANSITION CONTROL FOR TAKEOFF AND LANDING CONFIGURATIONS c05
H. P. Franz *In* ESA Boundary Layer Control by Transition Fixing (ESA-TT-909) Oct. 1985 p 17-31 Transl. into ENGLISH from "Grenzschichtsteverung durch Transitionsfixierung" rept. DFVLR-Mitt-84-17 DFVLR, Goettingen, West Germany, Sep. 1984 Original language document was announced as N85-23714 (For primary document see N87-15160 07-01)
Avail: NTIS HC A07/MF A01; original German version available from DFVLR, Cologne, West Germany DM 39

Wind tunnel test results were scaled to predict aircraft performance at low speed phases, taking into account Reynolds number effects. A possibility to define scaling laws is to fix the boundary layer transition from laminar to turbulent spatially in the model by artificial surface roughness. The boundary layer transition control has to be demonstrated by preliminary tests. The practical realization of surface roughness taking into account the required Mach-Reynolds combination and lift value is discussed. The method allows scaling to large aircraft of project-aerodynamic performance prediction. ESA

N87-15163# National Aerospace Lab., Amsterdam (Netherlands).
EXPERIENCES WITH TRANSITION FIXING IN THE HIGH SPEED REGIME AT NLR, NETHERLANDS c05
A. Elsenaar *In* ESA Boundary Layer Control by Transition Fixing (ESA-TT-909) Oct. 1985 p 33-56 Transl. into ENGLISH from "Grenzschichtsteverung durch Transitionsfixierung" rept. DFVLR-Mitt-84-17 DFVLR, Goettingen, West Germany, Sep. 1984 Original language document was announced as N85-23715 (For primary document see N87-15160 07-01)
Avail: NTIS HC A07/MF A01; original German version available from DFVLR, Cologne, West Germany DM 39

Transition fixing for transonic transport-type aircraft configurations is discussed. The use of wind tunnel measurements for flight prediction is explained, and practical problems of the fixing technique are discussed. Tests with free transition are qualitatively not representative for full scale. In order to predict flight conditions, extrapolation of Reynolds number trends is preferred; the aft-fixing technique is complementary when separations are expected at (low) tunnel Reynolds numbers. ESA

N87-15164# Messerschmitt-Boelkow-Blohm G.m.b.H., Bremen (West Germany). Unternehmensbereich Transport-und Verkehrsflugzeuge.
TRANSITION FIXING IN THE HIGH SPEED RANGE FOR THE DEVELOPMENT OF CIVIL AIRCRAFT WINGS c05

W. Burgsmueller *In* ESA Boundary Layer Control by Transition Fixing (ESA-TT-909) Oct. 1985 p 55-79 Transl. into ENGLISH from "Grenzschichtsteverung durch Transitionsfixierung" rept. DFVLR-Mitt-84-17 DFVLR, Goettingen, West Germany, Sep. 1984 Original language document was announced as N85-23716 (For primary document see N87-15160 07-01)
Avail: NTIS HC A07/MF A01; original German version available from DFVLR, Cologne, West Germany DM 39

Boundary layer transition fixing for the prediction of Airbus performance is discussed. Comparative measurements were conducted on competing aircraft. The effects of strip position and grain size on transition fixing are presented. The Delta method is used to determine the difference between wind tunnel tests and flight tests. The method to predict aircraft performances based on wind tunnel tests is explained. The presented fixing technique is very time consuming. Comparison between wing profiles is possible under certain conditions. The scaling by the Delta method provides usable results. Improvements of the fixing technique are desirable. ESA

N87-15165# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
TRANSITION FIXING ON WINGS IN INDUSTRIAL WIND TUNNELS AND ASSOCIATED PROBLEMS
V. Schmitt *In* ESA Boundary Layer Control by Transiion Fixing (ESA-TT-909) Oct. 1985 p 81-88 Transl. into ENGLISH from "Grenzschichtsteverung durch Transitionsfixierung" rept. DFVLR-Mitt-84-17 DFVLR, Goettingen, West Germany, Sep. 1984 Original language document was announced as N85-23717 (For primary document see N87-15160 07-01)
Avail: NTIS HC A07/MF A01; original German version available from DFVLR, Cologne, West Germany DM 39

A method for transition fixing on wings, based on the utilization of carborundum strips to produce an homogeneous turbulent boundary layer is presented. The choice of strip position and grain size is explained. The transition is visualized by thermography using an IR camera. The influence of the transition fixing is demonstrated. Problems in scaling the simulation results for high Reynolds numbers to large aircraft are discussed. ESA

N87-15166# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. for Design Aerodynamics.
THE INFLUENCE OF TRANSITION STRIPS ON THE PRESSURE DISTRIBUTION ON TRANSONIC PROFILES c02
R. Mueller *In* ESA Boundary Layer Control by Transition Fixing (ESA-TT-909) Oct. 1985 p 89-99 Transl. into ENGLISH from "Grenzschichtsteverung durch Transitionsfixierung" rept. DFVLR-Mitt-84-17 DFVLR, Goettingen, West Germany, Sep. 1984 Original language document was announced as N85-23718 (For primary document see N87-15160 07-01)
Avail: NTIS HC A07/MF A01; original German version available from DFVLR, Cologne, West Germany DM 39

Transonic wind tunnel tests were performed to determine the influence of transition strips on pressure distribution. Measurements were performed on three transport aircraft profiles, covering the Mach number range from 0.70 to 0.80. The transition strips are produced with Korund grain 220 K according to the DFVLR-TWB standard method and have a width of 1% of the model profile depth. The influence of the strips on the upper surface of the profile is extremely large, even for downstream, and also for high Reynolds numbers. The influence on the lower surface in the rear loading domain strongly decreases for high Reynolds numbers. The Reynolds number effect in free transition is orders of magnitude lower. At constant Reynolds number an increasing Mach number enhances the influence on the rear loading of the lower surface. The influence of the strips on the pressure distribution is shown for several cases. ESA

N87-15167# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. for Experimental Fluid Mechanics.
DEVELOPMENT OF AN ARTIFICIAL BOUNDARY LAYER FOR DIFFERENT OUTLET FLOWS c02
H. U. Meier and H.-P. Kreplin *In* ESA Boundary Layer Control by Transition Fixing (ESA-TT-909) Oct. 1985 p 100-102 Transl. into ENGLISH from "Grenzschichtsteverung durch Transitionsfixierung" rept. DFVLR-Mitt-84-17 DFVLR, Goettening, West Germany, Sep. 1984 Original language document was announced as N85-23719 (For primary document see N87-15160 07-01)
Avail: NTIS HC A07/MF A01; original German version available from DFVLR, Cologne, West Germany DM 39

Problems related to the wind tunnel technique using trip wires or surface roughness to produce an artificial laminar-turbulent boundary layer transition, are discussed. Artificial roughness on the surface causes loss in the boundary layer which is maintained downstream. Analysis shows that the development of this momentum loss downstream depends strongly on the outlet flow. A reaction on the boundary layer separation behavior can be expected. The development of a boundary layer momentum loss produced by a wire in a retarded outlet flow was experimentally studied; the results agree well with calculated values. ESA

N87-15168# Office National d'Etudes et de Recherches Aerospatiales, Toulouse (France). Dept. of Aerothermodynamics.
INVESTIGATION OF THE CONDITIONS FOR TRIPPING TRANSITION WITH ROUGHNESS ELEMENTS AND THEIR INFLUENCE ON BOUNDARY LAYER DEVELOPMENT c02
R. Michel and D. Arnal *In* ESA Boundary Layer Control by Transition Fixing (ESA-TT-909) Oct. 1985 p 103-113 Transl. into ENGLISH from "Grenzschichtsteverung durch Transitionsfixierung" rept. DFVLR-Mitt-84-17 DFVLR, Goettingen, West Germany, Sep. 1984 Original language document was announced as N85-23720 (For primary document see N87-15160 07-01)
Avail: NTIS HC A07/MF A01; original German version available from DFVLR, Cologne, West Germany DM 39

Boundary layer tripping with transverse wires at carborundum bands, in zero and nonzero pressure gradients, were experimentally studied using a flat plate in incompressible flow, for a great number of tripping devices. It appears that high turbulence intensities are not created on the roughness itself, but rather in the downstream separated region. The critical grain size required for fixing transition at the roughness location is plotted. Increasing the grain size produces an overthickness of the boundary layer due to the roughness drag. The drag coefficient increases when the roughness height is larger than the boundary layer thickness. Similar results are obtained in negative and positive pressure gradients. Applications on wing profiles in incompressible and compressible flows are presented. ESA

N87-15169# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Experimentelle Stroemungsmechanik.
TRANSITION FIXING AND SIMULATION OF HIGH REYNOLDS NUMBER FLOW AT TRANSONIC VELOCITIES c02
E. Stanewsky *In* ESA Boundary Layer Control by Transition Fixing (ESA-TT-909) Oct. 1985 p 115-129 Transl. into ENGLISH from "Grenzschichtsteverung durch Transitionsfixierung" rept. DFVLR-Mitt-84-17 DFVLR, Goettingen, West Germany, Sep. 1984 Original language document was announced as N85-23721 (For primary document see N87-15160 07-01)
Avail: NTIS HC A07/MF A01; original German version available from DFVLR, Cologne, West Germany DM 39

The simulation of two-dimensional high Reynolds flow was investigated. Airfoil tests up to relatively high Reynolds numbers, using airfoils of various sensitivities to Reynolds number changes, show that the initial displacement thickness has a dominant influence on the flow development about transonic airfoils. The duplication of the initial displacement thickness seems adequate to simulate high Reynolds number flow with shock waves, at least for free stream conditions without excessive separated regions. The possible errors associated with such a simulation and the simultaneous simulation of all aerodynamic parameters are considered. This simulation seems to be applicable to separated flow. It is concluded that the method allows simulation of two-dimensional high Reynolds number flow. ESA

N87-15170# National Aerospace Lab., Emmeloord (Netherlands).
TRANSITION DETECTION USING SURFACE PRESSURE HOLES c02
B. vandenBerg *In* ESA Boundary Layer Control by Transition Fixing (ESA-TT-909) Oct. 1985 p 131-138 Transl. into ENGLISH from "Grenzshchichtsteverung durch Transitionsfixierung" rept. DFVLR-Mitt-84-17 DFVLR, Goettingen, West Germany, Sep. 1984 Original language document was announced as N85-23722 (For primary document see N87-15160 07-01)
Avail: NTIS HC A07/MF A01; original German version available from DFVLR, Cologne, West Germany DM 39

An experimental method to establish the boundary layer transition position on wind tunnel models is presented. The information whether the boundary layer is laminar or turbulent is present in the static pressure holes in the surface of wind tunnel models since the surface static pressure beneath a turbulent boundary layer fluctuates, while it does not with a laminar flow. This pressure fluctuation level is very small. A much larger fluctuation level exists when blowing through the surface hole is applied. The pressure fluctuations are measured with a microphone. The amplification effects of blowing through the hole on the fluctuating output of the microphone is determined. The fluctuating pressure level attains a maximum in the transition region. A clear maximum is still apparent when long tubes are used between the pressure hole and the microphone. It is concluded that transition detection using surface static pressure holes is feasible. ESA

N87-15171# Technische Univ., Berlin (West Germany). Aerospace Inst.
INVESTIGATION OF THE EXPERIMENTAL DETECTION OF BOUNDARY LAYER TRANSITION c02
W. Nitsche, R. Thuenker, and C. Haberland *In* ESA Boundary Layer Control by Transition Fixing (ESA-TT-909) Oct. 1985 p 139-145 Transl. into ENGLISH from "Grenzschichtsteverung durch Transitionsfixierung" rept. DFVLR-Mitt-84-17 DFVLR, Goettingen, West Germany, Sep. 1984 Original language document was announced as N85-23723 (For primary document see N87-15160 07-01)
Avail: NTIS HC A07/MF A01; original German version available from DFVLR, Cologne, West Germany DM 39

Wind tunnel tests to detect boundary layer transitions based on the measurement of wall shear stress and local wall pressure fluctuations were performed. The detection of transition using these two methods is demonstrated for simple transition flows (flat plate, pipe entrance). For wall shear stress measurement, surface hot-film, sublayer fence and computational Preston tube can be used in transition flows, while the conventional Preston tube gives only qualitative information. The strong increase of the local wall pressure fluctuations due to the boundary layer transition enables a transition detection using pressure transducers with high time resolution and sensors reacting to pressure fluctuations such as piezofoils. Comparisen of several foil signals allows the transition domain to be localized. ESA

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N87-15172 Brown Univ., Providence, R. I.
TRANSONIC CONTROVERSY AND REGULAR PERTURBATION METHODS FOR SUBCRITICAL FLOWS Ph.D. Thesis
Yue-Kuen Kwok 1986 96 p
Avail: Univ. Microfilms Order No. DA8617584

The flow of an inviscid, irrotational and compressible perfect gas in the upper half plane is used as a model to investigate the transonic controversy. The solution of the complete potential equations for the velocity potential was developed as a regular perturbation series. The result of the analysis shows that the phenomenon of shockless transonic flow is dependent on the imposed boundary condition. Regular perturbation methods, namely the Jansen-Rayleigh expansion and the Prandtl-Glaubert expansion, are used to solve steady, inviscid, irrotational, subcritical flow field over arbitrary two-dimensional bodies. To facilitate the computation, the particular integrals of successive order equations are found. As compared with other numerical methods, these methods are easier to implement, use much less computation time, and less computer storage. The order of accuracy is generally higher than most approximation methods. Dissert. Abstr.

N87-15173*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
VISCOUS ANALYSES FOR FLOW THROUGH SUBSONIC AND SUPERSONIC INTAKES
Louis A. Povinelli and Charles E. Towne 9 Sep. 1986 24 p Presented at the AGARD Propulsion and Energetics Panel Meeting on Engine Response to Distorted Inflow Conditions, Munich, Germany, 8-9 Sep. 1986
(NASA-TM-88831; E-3209; NAS 1.15:88831) Avail: NTIS HC A02/MF A01 CSCL 01A

A parabolized Navier-Stokes code was used to analyze a number of diffusers typical of a modern inlet design. The effect of curvature of the diffuser centerline and transitioning cross sections was evaluated to determine the primary cause of the flow distortion in the duct. Results are presented for S-shaped intakes with circular and transitioning cross sections. Special emphasis is placed on verification of the analysis to accurately predict distorted flow fields resulting from pressure-driven secondary flows. The effect of vortex generators on reducing the distortion of intakes is presented. Comparisons of the experimental and analytical total pressure contours at the exit of the intake exhibit good agreement. In the case of supersonic inlets, computations of the inlet flow field reveal that large secondary flow regions may be generated just inside of the intake. These strong flows may lead to separated flow regions and cause pronounced distortions upstream of the compressor.
Author

N87-15174*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
APPLICABILITY OF LINEARIZED-THEORY ATTACHED-FLOW METHODS TO DESIGN AND ANALYSIS OF FLAP SYSTEMS AT LOW SPEEDS FOR THIN SWEPT WINGS WITH SHARP LEADING EDGES
Harry W. Carlson and Christine M. Darden Jan. 1987 54 p
(NASA-TP-2653; L-16151; NAS 1.60:2653) Avail: NTIS HC A04/MF A01 CSCL 01A

Low-speed experimental force and data on a series of thin swept wings with sharp leading edges and leading and trailing-edge flaps are compared with predictions made using a linearized-theory method which includes estimates of vortex forces. These comparisons were made to assess the effectiveness of linearized-theory methods for use in the design and analysis of flap systems in subsonic flow. Results demonstrate that linearized-theory, attached-flow methods (with approximate representation of vortex forces) can form the basis of a rational system for flap design and analysis. Even attached-flow methods that do not take vortex forces into account can be used for the selection of optimized flap-system geometry, but design-point performance levels tend to be underestimated unless vortex forces are included. Illustrative examples of the use of these methods in the design of efficient low-speed flap systems are included. Author

N87-15175*# McDonnell-Douglas Helicopter Co., Mesa, Ariz.
APPLICATION OF HIGHER HARMONIC BLADE FEATHERING ON THE OH-6A HELICOPTER FOR VIBRATION REDUCTION Final Report
F. K. Straub and E. V. Byrns, Jr. Washington NASA 1986 190 p
(Contract NAS1-16266)
(NASA-CR-4031; NAS 1.26:4031) Avail: NTIS HC A09/MF A01 CSCL 01A

The design, implementation, and flight test results of higher harmonic blade feathering for vibration reduction on the OH-6A helicopter are described. The higher harmonic control (HHC) system superimposes fourth harmonic inputs upon the stationary swashplate. These inputs are transformed into 3P, 4P and 5P blade feathering angles. This results in modified blade loads and reduced fuselage vibrations. The primary elements of this adaptive vibration suppression system are: (1) acceleration transducers sensing the vibratory response of the fuselage; (2) a higher harmonic blade pitch actuator system; (3) a flightworthy microcomputer, incorporating the algorithm for reducing vibrations, and (4) a signal conditioning system, interfacing between the sensors, the microcomputer and the HHC actuators. The program consisted of three distinct phases. First, the HHC system was designed and implemented on the MDHC OH-6A helicopter. Then, the open loop, or manual controlled, flight tests were performed, and finally, the closed loop adaptive control system was tested. In 1983, one portion of the closed loop testing was performed, and in 1984, additional closed loop tests were conducted with improved software. With the HHC system engaged, the 4P pilot seat vibration levels were significantly lower than the baseline ON-6A levels. Moreover, the system did not adversely affect blade loads or helicopter performance. In conclusion, this successful proof of concept project demonstrated HHC to be a viable vibration suppression mechanism. Author

N87-15176*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

AN EFFICIENT ALGORITHM FOR SOLUTION OF THE UNSTEADY TRANSONIC SMALL-DISTURBANCE EQUATION

John T. Batina Dec. 1986 14 p Proposed for presentation at the AIAA 25th Aerospace Sciences Meeting

(NASA-TM-89014; NAS 1.15:89014; AIAA-86-0109) Avail: NTIS HC A02/MF A01 CSCL 01A

A time accurate approximate factorization (AF) algorithm is formulated for solution of the three dimensional unsteady transonic small-disturbance equation. The AF algorithm consists of a time linearization procedure coupled with a Newton iteration technique. Superior stability characteristics of the new algorithm are demonstrated through applications to steady and oscillatory flows at subsonic and supersonic freestream conditions for an F-5 fighter wing. For steady flow calculations, the size of the time step is cycled to achieve rapid convergence. For unsteady flow calculations, the AF algorithm is sufficiently robust to allow the step size to be selected based on accuracy rather than on stability considerations. Therefore, accurate solutions are obtained in only several hundred time steps yielding a significant computational cost savings when compared to alternative methods. Author

N87-15177*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

LaRC CONCEPTUAL DESIGN OF SOLID ROCKET BOOSTER IN-LINE BOLTED JOINT

Dec. 1986 89 p Original contains color illustrations

(NASA-TM-89046; NAS 1.15:89046) Avail: NTIS HC A05/MF A01 CSCL 01A

An alternate STS Solid Rocket Booster (SRB) joint has been designed to perform safely and reliably under STS launch conditions. All design requirements for the SRB have been considered in addition to an evaluation criteria developed by LaRC to assess other candidate designs. Two primary objectives were to design an SRB pressure shell sealing system that would be seated at assembly, and remain seated, and also be protected from the hot internal gases during burning. An interdisciplinary team was formed and the resulting design is a bolted in-line flanged joint sealed with an elastomeric O ring and a metal C ring. Flange gapping at the sealing surface is prevented by recessing the preloaded bolts to provide a compression load directly on the flange (at the sealing interface). Internal hot gas protection is provided to the joint by compressing a soft elastomer seal between rigid rings bonded to the pressure shell. The redesign, manufacturing, and verification testing does not represent a major technical problem and the joint can be further optimized for weight reduction. Author

N87-15178*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

A COMPARISON OF THE ACOUSTIC AND AERODYNAMIC MEASUREMENTS OF A MODEL ROTOR TESTED IN TWO ANECHOIC WIND TUNNELS

D. A. Boxwell (Army Aviation Research and Technology Activity, Cleveland, Ohio), F. H. Schmitz, W. R. Splettstoesser (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick, West Germany), K. J. Schultz, S. Lewy (Office National d'Etudes et de Recherches Aeronautiques, Paris, France), and M. Caplot Nov. 1986 56 p Presented at the 12th European Rotorcraft Forum, Garmisch-Partenkirchen, West Germany, Sep. 1986

(NASA-TM-88364; A-86417; NAS 1.15:88364; USAAVSCOM-TM-86-A-6; Paper-38-1) Avail: NTIS HC A04/MF A01 CSCL 01A

Two aeroacoustic facilities--the CEPRA 19 in France and the DNW in the Netherlands--are compared. The two facilities have unique acoustic characteristics that make them appropriate for acoustic testing of model-scale helicopter rotors. An identical pressure-instrumented model-scale rotor was tested in each facility and acoustic test results are compared with full-scale-rotor test results. Blade surface pressures measured in both tunnels were used to correlated nominal rotor operating conditions in each tunnel, and also used to assess the steadiness of the rotor in each tunnel's flow. In-the-flow rotor acoustic signatures at moderate forward speeds (35-50 m/sec) are presented for each facility and discussed in relation to the differences in tunnel geometries and aeroacoustic characteristics. Both reports are presented in appendices to this paper. Author

N87-15179*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

UNSTEADY AERODYNAMIC LOAD ESTIMATES ON TURNING VANES IN THE NATIONAL FULL-SCALE AERODYNAMIC COMPLEX

Thomas R. Norman Dec. 1986 75 p

(NASA-TM-88191; A-86015; NAS 1.15:88191) Avail: NTIS HC A04/MF A01 CSCL 01A

Unsteady aerodynamic design loads have been estimated for each of the vane sets in the National Full-Scale Aerodynamic Complex (NFAC). These loads include estimates of local loads over one vane section and global loads over an entire vane set. The analytical methods and computer programs used to estimate these loads are discussed. In addition, the important computer input parameters are defined and the rationale used to estimate them is discussed. Finally, numerical values are presented for both the computer input parameters and the calculated design loads for each vane set. Author

N87-15180*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

LOW-SPEED AERODYNAMIC CHARACTERISTICS OF A WING-CANARD CONFIGURATION WITH UNDERWING SPANWISE BLOWING ON THE TRAILING-EDGE FLAP SYSTEM

Daniel W. Banks and John W. Paulson, Jr. Jan. 1987 115 p

(NASA-TM-89020; L-16161; NAS 1.15:89020) Avail: NTIS HC A06/MF A01 CSCL 01A

An investigation of the effects of spanwise blowing applied to the lower surface of a trailing-edge flap system on a wing-canard configuration has been conducted in the Langley 4- by 7-Meter Tunnel. The investigation studied spanwise-blowing angles of 30 deg., 45 deg., and 60 deg. measured from a perpendicular to the body center-line. The test conditions covered a range of free-stream dynamic pressures up to 50 psf for thrust coefficients up to 2.1 over a range of angles of attack from -2 deg. to 26 deg. Model height above the wind tunnel floor was varied from a height-to-span ratio of 1.70 down to 0.20 (a representative wheel touchdown height). The results indicate that blowing angles of 30 deg. and 45 deg. increase the induced-lift increment produced by spanwise blowing on the lower surface of a trailing-edge flap system. Increasing the blowing angle to 60 deg., in general, produces little further improvement. Author

N87-15181*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

AGARD FLUID DYNAMICS PANEL SYMPOSIUM ON APPLICATIONS OF COMPUTATIONAL FLUID DYNAMICS IN AERONAUTICS: PROCEEDINGS

W. J. McCroskey Dec. 1986 19 p Symposium held in Aix-en-Provence, France, 7-10 Apr. 1986

(NASA-TM-88356; A-86399; NAS 1.15:88356) Avail: NTIS HC A02/MF A01 CSCL 01A

The Fluid Dynamics Panel of AGARD arranged a Symposium on Applications of Computational Fluid Dynamics in Aeronautics, on 7 to 10 April 1986 in Aix-en-Provence, France. The purpose of the Symposium was to provide an assessment of the status of CFD in aerodynamic design and analysis, with an emphasis on emerging applications of advanced computational techniques to complex configurations. Sessions were devoted specifically to grid generation, methods for inviscid flows, calculations of viscous-inviscid interactions, and methods for solving the Navier-Stokes equations. The 31 papers presented at the meeting are published in AGARD Conference Proceedings CP-412 and are listed in the Appendix of this report. A brief synopsis of each paper and some general conclusions and recommendations are given. Author

N87-15182*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

AERODYNAMIC CHARACTERISTICS OF TWO-DIMENSIONAL WING CONFIGURATIONS AT ANGLES OF ATTACK NEAR -90 DEG

Martin Maisel, Georgene Laub, and W. J. McCroskey Dec. 1986 84 p

(NASA-TM-88373; A-86427; NAS 1.15:88373; USAAVSCOM-TM-86-A-8) Avail: NTIS HC A05/MF A01 CSCL 01A

Wind tunnel tests were conducted to determine the drag of two-dimensional wing sections operating in a near-vertical flow condition. Various leading- and trialing-edge configurations, including plain flaps of 25, 30, and 35% chord were tested at angles of attack from -75 to -105 deg. Reynolds numbers examined ranged from approximately 0.6 x 10 to the 6th power to 1.4 x 10 to the 6th power. The data were obtained using a wind tunnel force and moment balance system and arrays of chordwise pressure orifices. The results showed that significant reductions in drag, beyond what would be expected by virtue of the decreased frontal area, were obtainable with geometries that delayed flow separation. Rapid changes in drag with angle of attack were noted for many configurations. The results, however, were fairly insensitive to Reynolds number variations. Drag values computed from the pressure data generally agreed with the force data within 2%. Author

N87-15183*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

EFFICIENT SOLUTIONS TO THE EULER EQUATIONS FOR SUPERSONIC FLOW WITH EMBEDDED SUBSONIC REGIONS

Robert W. Walters and Douglas L. Dwoyer Jan. 1987 18 p

(NASA-TP-2523; L-15975; NAS 1.60:2523) Avail: NTIS HC A02/MF A01 CSCL 01A

A line Gauss-Seidel (LGS) relaxation algorithm in conjunction with a one-parameter family of upwind discretizations of the Euler equations in two dimensions is described. Convergence of the basic algorithm to the steady state is quadratic for fully supersonic flows and is linear for other flows. This is in contrast to the block alternating direction implicit methods (either central or upwind differenced) and the upwind biased relaxation schemes, all of which converge linearly, independent of the flow regime. Moreover, the algorithm presented herein is easily coupled with methods to detect regions of subsonic flow embedded in supersonic flow. This allows marching by lines in the supersonic regions, converging each line quadratically, and iterating in the subsonic regions, and yields a very efficient iteration strategy. Numerical results are presented for two-dimensional supersonic and transonic flows containing oblique and normal shock waves which confirm the efficiency of the iteration strategy. Author

N87-15184*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

SUBSONIC MANEUVER CAPABILITY OF A SUPERSONIC CRUISE FIGHTER WING CONCEPT

Gregory D. Riebe and Charles H. Fox, Jr. Jan. 1987 74 p

(NASA-TP-2642; L-16097; NAS 1.60:2642) Avail: NTIS HC A04/MF A01 CSCL 01A

A theoretical and experimental investigation was conducted of the subsonic maneuver capability of a fighter wing concept designed for supersonic cruise. To improve the subsonic maneuver capability, the wing utilized full-span leading- and trailing-edge flaps that were designed with the aid of a subsonic-analysis computer program. Wind-tunnel tests were made at Mach numbers of 0.3, 0.5, and 0.7. Force and moment data obtained were compared with theoretical predictions of Mach 0.5 from two subsonic-analysis computer programs. The two theoretical programs gave a good prediction of the lift and drag characteristics but only a fair prediction of the pitching moment. The experimental results of this study show that with the proper combination of leading- and trailing-edge flap deflections, a suction parameter of nearly 90 percent can be attained at a Mach number of 0.5 and a lift coefficient of 0.73; this is a three-fold improvement from 30 percent for the basic wing. Author

N87-15185*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

PRELIMINARY STUDY OF A WING-TIP VORTEX USING LASER VELOCIMETRY

R. K. Takahashi and K. W. McAlister Jan. 1987 34 p

(NASA-TM-88343; A-86207; NAS 1.15:88343; AVSCOM-TM-86-A-2) Avail: NTIS HC A03/MF A01 CSCL 01A

Measurements have been made in the wake of a semi-span NACA 0015 airfoil with emphasis on the region of the wing tip vortex. The spanwise and streamwise velocity components were measured using a two-component laser Doppler velocimeter. The purpose of the study was to initiate the operation of a laser velocimeter system and to perform preliminary wake measurements in preparation for a more extensive study of the structure and near field development of a tip vortex. Author

N87-15186*# Kansas Univ. Center for Research, Inc., Lawrence. Flight Research Lab.

TRANDESNF: A COMPUTER PROGRAM FOR TRANSONIC AIRFOIL DESIGN AND ANALYSIS IN NONUNIFORM FLOW

J. F. Chang and C. Edward Lan Washington NASA Jan. 1987 70 p

(Grant NAG1-308)

(NASA-CR-4044; NAS 1.26:4044; KU-FRL-602-1) Avail: NTIS HC A04/MF A01 CSCL 01A

The use of a transonic airfoil code for analysis, inverse design, and direct optimization of an airfoil immersed in propfan slipstream is described. A summary of the theoretical method, program capabilities, input format, output variables, and program execution are described. Input data of sample test cases and the corresponding output are given. Author

N87-15187*# Old Dominion Univ., Norfolk, Va. Research Foundation.

A SIMPLIFIED FOURWALL INTERFERENCE ASSESSMENT PROCEDURE FOR AIRFOIL DATA OBTAINED IN THE LANGLEY 0.3-METER TRANSONIC CRYOGENIC TUNNEL

A. V. Murthy Washington NASA Jan. 1987 59 p

(Grant NAG1-334)

(NASA-CR-4042; NAS 1.26:4042) Avail: NTIS HC A04/MF A01 CSCL 01A

A simplified fourwall interference assessment method has been described, and a computer program developed to facilitate correction of the airfoil data obtained in the Langley 0.3-m Transonic Cryogenic Tunnel (TCT). The procedure adopted is to first apply a blockage correction due to sidewall boundary-layer effects by

various methods. The sidewall boundary-layer corrected data are then used to calculate the top and bottom wall interference effects by the method of Capallier, Chevallier and Bouinol, using the measured wall pressure distribution and the model force coefficients. The interference corrections obtained by the present method have been compared with other methods and found to give good agreement for the experimental data obtained in the TCT with slotted top and bottom walls. Author

N87-15188*# Rockwell International Science Center, Thousand Oaks, Calif.
DEVELOPMENT OF UPWIND SCHEMES FOR THE EULER EQUATIONS Final Report, 12 Oct. 1983 - 27 Feb. 1986
Sukumar R. Chakravarthy Washington NASA Jan. 1987 139 p (Contract NAS1-17492)
(NASA-CR-4043; NAS 1.26:4043; SC5388.40FR) Avail: NTIS HC A07/MF A01 CSCL 01A

Described are many algorithmic and computational aspects of upwind schemes and their second-order accurate formulations based on Total-Variation-Diminishing (TVD) approaches. An operational unification of the underlying first-order scheme is first presented encompassing Godunov's, Roe's, Osher's, and Split-Flux methods. For higher order versions, the preprocessing and postprocessing approaches to constructing TVD discretizations are considered. TVD formulations can be used to construct relaxation methods for unfactored implicit upwind schemes, which in turn can be exploited to construct space-marching procedures for even the unsteady Euler equations. A major part of the report describes time- and space-marching procedures for solving the Euler equations in 2-D, 3-D, Cartesian, and curvilinear coordinates. Along with many illustrative examples, several results of efficient computations on 3-D supersonic flows with subsonic pockets are presented. Author

N87-15189# Grumman Aerospace Corp., Bethpage, N.Y.
CANARD/TAIL TRANSONIC ANALYSIS Final Technical Report, Jun. 1981 - Jun. 1985
P. Aidala Oct. 1985 123 p (Contract F33615-81-C-3013)
(AD-A171075; AFWAL-TR-85-3087) Avail: NTIS HC A06/MF A01 CSCL 20/4

The theoretical and operational characteristics of the CANTATA code are described. The code provides 3 D transonic analysis of wing-body-canard or wing-body-tail configurations. The relative placement of the two lifting surfaces is arbitrary. The potential flow solution of the code uses a new ADI algorithm, AF2YZ. The algorithm is a three step procedure which uses a split streamwise operator, with a simple factorization of the cross-plane terms. The analysis includes the ability to allow the vortex sheets from the lifting surfaces to move under the influence of the local velocity. Wake rollup is modeled by merging vortex lines such that a single-valued spanwise shape is maintained. Viscous effects are included through the use of a strip boundary layer method. The overall code includes a numerical optimization routine that can be used to alter the lifting surface geometry in an automated design procedure. GRA

N87-15190# Georgia Inst. of Tech., Atlanta. School of Aerospace Engineering.
WIND TUNNEL DATA FROM A ROTOR WAKE/AIRFRAME INTERACTION STUDY Interim Technical Report
A. G. Brand, N. M. Komerath, and H. M. McMahon Jul. 1986 103 p (Contract DAAG29-82-K-0094)
(AD-A171333; ARO-19364.18-EG-RW) Avail: NTIS HC A06/MF A01 CSCL 01/1

Accurate prediction and understanding of the aerodynamic interactions between a rotor and airframe are essential to the improvement of future rotorcraft. Large amounts of energy are added by the lifting rotor to an otherwise uniform free stream. The resulting wake flow interaction with the airframe has led to problems in dynamics, performance, acoustics and handling qualities. The interaction phenomena associated with a rotor/airframe in forward flight are currently under study as part of a research effort in the Rotary Wing Technology Center sponsored by the U.S. Army at Georgia Tech. The objective of this program is the systematic measurement of interaction effects and the validation of prediction codes using these measurements. This report presents the aerodynamic interaction data base that has been generated in experiments conducted in the John J. Harper 7x9-foot wind tunnel at Georgia Tech. It is hoped that these results will be useful as a guide in the development of prediction codes as well as providing a test for their validity. Author (GRA)

N87-15191# Ballistic Research Labs., Aberdeen Proving Ground, Md.
DRAG PREDICTIONS FOR PROJECTILES AT TRANSONIC AND SUPERSONIC SPEEDS Final Report
Jubaraj Sahu Jun. 1986 49 p
(AD-A171462; AD-F300785; BRL-MR-3523) Avail: NTIS HC A03/MF A01 CSCL 20/4

The breakdown of the total drag into its individual components (pressure drag, viscous drag, and base drag) is important in the preliminary design stage of a shell. Design codes are available to predict the individual drag components and thus, the total drag. Typically, the total drag predicted by these design codes agrees well with the total drag measured from flight tests. But, how well do these codes predict the individual drag components? Experimental verification of the prediction of the drag components is an extremely difficult task. Thus a Navier-Stokes computational procedure is used in this report to predict the individual drag components and test the accuracy of the predictions of the design codes. A thin-layer Navier-Stokes code has been used to compute the entire flow field over projectiles including the base region. Numerical calculations have been made for various Mach numbers in the transonic and supersonic regimes. Pressure drag, skin friction drag, base drag and thus, the total drag are obtained from the computed results. Comparison of drag has been made with available experimental data and also with predictions from design codes employing semi-empirical techniques. GRA

N87-15166# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. for Design Aerodynamics.
THE INFLUENCE OF TRANSITION STRIPS ON THE PRESSURE DISTRIBUTION ON TRANSONIC PROFILES
R. Mueller *In* ESA Boundary Layer Control by Transition Fixing (ESA-TT-909) Oct. 1985 p 89-99 Transl. into ENGLISH from "Grenzschichtsteverung durch Transitionsfixierung" rept. DFVLR-Mitt-84-17 DFVLR, Goettingen, West Germany, Sep. 1984 Original language document was announced as N85-23718 (For primary document see N87-15160 07-01)
Avail: NTIS HC A07/MF A01; original German version available from DFVLR, Cologne, West Germany DM 39

N87-15167# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. for Experimental Fluid Mechanics.
DEVELOPMENT OF AN ARTIFICIAL BOUNDARY LAYER FOR DIFFERENT OUTLET FLOWS
H. U. Meier and H.-P. Kreplin *In* ESA Boundary Layer Control by Transition Fixing (ESA-TT-909) Oct. 1985 p 100-102 Transl. into ENGLISH from "Grenzschichtsteverung durch Transitionsfixierung" rept. DFVLR-Mitt-84-17 DFVLR, Goettening, West Germany, Sep. 1984 Original language document was announced as N85-23719 (For primary document see N87-15160 07-01)
Avail: NTIS HC A07/MF A01; original German version available from DFVLR, Cologne, West Germany DM 39

N87-15168# Office National d'Etudes et de Recherches Aerospatiales, Toulouse (France). Dept. of Aerothermodynamics.
INVESTIGATION OF THE CONDITIONS FOR TRIPPING TRANSITION WITH ROUGHNESS ELEMENTS AND THEIR INFLUENCE ON BOUNDARY LAYER DEVELOPMENT
R. Michel and D. Arnal *In* ESA Boundary Layer Control by Transition

Fixing (ESA-TT-909) Oct. 1985 p 103-113 Transl. into ENGLISH from "Grenzxchichtsteverung durch Transitionsfixierung" rept. DFVLR-Mitt-84-17 DFVLR, Goettingen, West Germany, Sep. 1984 Original language document was announced as N85-23720 (For primary document see N87-15160 07-01)
Avail: NTIS HC A07/MF A01; original German version available from DFVLR, Cologne, West Germany DM 39

N87-15169# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Experimentelle Stroemungsmechanik.
TRANSITION FIXING AND SIMULATION OF HIGH REYNOLDS NUMBER FLOW AT TRANSONIC VELOCITIES
E. Stanewsky *In* ESA Boundary Layer Control by Transition Fixing (ESA-TT-909) Oct. 1985 p 115-129 Transl. into ENGLISH from "Grenzschichtsteverung durch Transitionsfixierung" rept. DFVLR-Mitt-84-17 DFVLR, Goettingen, West Germany, Sep. 1984 Original language document was announced as N85-23721 (For primary document see N87-15160 07-01)
Avail: NTIS HC A07/MF A01; original German version available from DFVLR, Cologne, West Germany DM 39

N87-15170# National Aerospace Lab., Emmeloord (Netherlands).
TRANSITION DETECTION USING SURFACE PRESSURE HOLES
B. vandenBerg *In* ESA Boundary Layer Control by Transition Fixing (ESA-TT-909) Oct. 1985 p 131-138 Transl. into ENGLISH from "Grenzshchichtsteverung durch Transitionsfixierung" rept. DFVLR-Mitt-84-17 DFVLR, Goettingen, West Germany, Sep. 1984 Original language document was announced as N85-23722 (For primary document see N87-15160 07-01)
Avail: NTIS HC A07/MF A01; original German version available from DFVLR, Cologne, West Germany DM 39

N87-15171# Technische Univ., Berlin (West Germany). Aerospace Inst.
INVESTIGATION OF THE EXPERIMENTAL DETECTION OF BOUNDARY LAYER TRANSITION
W. Nitsche, R. Thuenker, and C. Haberland *In* ESA Boundary Layer Control by Transition Fixing (ESA-TT-909) Oct. 1985 p 139-145 Transl. into ENGLISH from "Grenzschichtsteverung durch Transitionsfixierung" rept. DFVLR-Mitt-84-17 DFVLR, Goettingen, West Germany, Sep. 1984 Original language document was announced as N85-23723 (For primary document see N87-15160 07-01)
Avail: NTIS HC A07/MF A01; original German version available from DFVLR, Cologne, West Germany DM 39

N87-15224# Stuttgart Univ. (West Germany). Inst. fuer Aerodynamik und Gasdynamik.
A SIMPLE CONCEPT FOR THE COMPUTATION OF STEADY SUPERSONIC FLOW WITH SUPPLY OF HEAT
K. Foerster *In its* Thermodynamic and Flow Mechanical Problems in Aircraft and Spacecraft Drives. Summary of Conference Reports for 1974, 1975, 1976 2 Aug. 1976 p 16-23 Presented at GAMM-Fachausschusses fuer Numerische Methoden in der Stroemungsmechanik, Porz-Wahn, West Germany, 8-10 Oct. 1975 Sponsored by Deutsches Forschungsgemeinschaft (For primary document see N87-15223 07-07)
Avail: NTIS HC A07/MF A01

N87-15228# Stuttgart Univ. (West Germany).
PROBLEMS OF THE COMPENSATION CALCULATION FOR THE INTERFEROMETRY OF SPATIAL FLOWS [PROBLEME DER AUSGLEICHSRECHNUNG BEI DER INTERFEROMETRIE RAEUMLICHER STROEMUNGEN]
W. Schmidt *In its* Thermodynamic and Flow Mechanical Problems in Aircraft and Spacecraft Drives. Summary of Conference Reports for 1974, 1975, 1976 2 Aug. 1976 p 124-135 In GERMAN (For primary document see N87-15223 07-07)
Avail: NTIS HC A07/MF A01

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N87-15192# National Interagency Coordination Group.
INTERNATIONAL AEROSPACE AND GROUND CONFERENCE ON LIGHTNING AND STATIC ELECTRICITY. TECHNICAL PAPERS: THE KEY TO LIGHTNING TECHNOLOGY, HELD IN ORLANDO, FLORIDA ON 26-28 JUNE 1984
Jun. 1984 488 p Conference held in Orlando, Fla., 26-28 Jun. 1984
(AD-A169867) Avail: NTIS HC A21/MF A01 CSCL 01/5

The proceedings of the conference are presented. Some titles of the papers presented are: Triggered lightning and corona; Lightning locators; Detection and protection; Indirect effects on systems; Ground systems protections; and Aircraft systems. Some other titles are: Lightning characterization; Thunderstorm studies; Fuel ignition hazards; Lightning stroke measurement; Impulse generators and measurements; Charging mechanisms; and Aircraft and aerospace testing. E.R.

N87-15193# RMS Technologies, Inc., Trevose, Pa.
SEAT EXPERIMENT RESULTS OF FULL-SCALE TRANSPORT AIRCRAFT CONTROLLED IMPACT DEMONSTRATION Final Report, Jan. - Jul. 1985
Mark R. Cannon and Richard E. Zimmermann Jul. 1986 261 p Prepared in cooperation with Simula, Inc., Phoenix, Ariz.
(Contract DTFA03-81-C-0040)
(AD-A172245; TR-85413; DOT/FAA/CT-85/25) Avail: NTIS HC A12/MF A01 CSCL 01/3

This report describes the results of the Federal Aviation Administration (FAA) seat experiments tested in the joint FAA/NASA Controlled Impact Demonstration (CID). Twenty-three seats were placed on the test aircraft. Thirteen seats were modifications of existing transport seats which were designed structurally to improve their crashworthiness. The remaining experiments were unmodified standard seats which included seven light and heavy-weight forward-facing seats, two aft-facing seats, and one flight attendant seat. Three additional seat experiments were placed onboard the test aircraft: two by NASA, and one by a private contractor. Onboard instrumentation was placed at specific locations to obtain data pertaining to airframe structural loads and seat/occupant response. Accelerometers were attached to the airframe and floor structure, the seat experiments, and the anthropomorphic dummies occupying the seats. The data base resulting from the test was intended for validating crash prediction models and occupant/seat dynamic simulation models. GRA

N87-15194# Federal Aviation Administration, Washington, D.C. Office of Flight Operations.
TASK FORCE ON EMERGENCY EVACUATION OF TRANSPORT AIRPLANES. VOLUME 2: SUPPORTING DOCUMENTATION Final Report
Jul. 1986 474 p
(AD-A172256; DOT/FAA/VS-86-1-Vol-2) Avail: NTIS HC A20/MF A01 CSCL 01/2

This is volume 2 of two volumes that report on the study of the emergency evacuation of transport airplanes that was sponsored by the Federal Aviation Administration (FAA). The study included the Public Technical Conference held by the FAA in September 1985 and the public meetings of the three technical working groups that were formed during the conference as part of a task force effort to coordinate the program. The working groups are: Design and Certification, Training and Operations, and Maintenance and Reliability. Contents: List of hearings, conferences, and Meetings--Places and Dates; Federal Register Announcement of Public Technical Conference; Attendance List for Public Technical Conference; Summary of Congressional Hearing and Public Technical Conference; Formal Presentations

of the Public Technical Conference; Working Group Interim Reports and Background Information. GRA

N87-15195# National Transportation Safety Board, Washington, D. C. Bureau of Field Operations.
AIRCRAFT ACCIDENT REPORTS: BRIEF FORMAT, US CIVIL AND FOREIGN AVIATION, ISSUE NUMBER 7 OF 1985 ACCIDENTS
2 Jul. 1986 402 p
(PB86-916921; NTSB-AAB-86-21) Avail: NTIS HC A18/MF A01; also available on subscription, North American Continent HC $185.00/year; all others write for quote CSCL 01B

Aircraft accident reports in brief format occurring in U.S. civil and foreign aviation operations during calendar year 1985 are given. Approximately 200 general aviation and air carrier accidents contained in the publication represent a random selection. GRA

N87-15196# National Transportation Safety Board, Washington, D. C. Bureau of Field Operations.
AIRCRAFT ACCIDENT REPORTS: BRIEF FORMAT, US CIVIL AND FOREIGN AVIATION, ISSUE NUMBER 6 OF 1985 ACCIDENTS
15 Jul. 1986 390 p
(PB86-916920; NTSB-AAB-86-20) Avail: NTIS HC A17/MF A01; also avialbble on subscription, North American Continent HC $185.00/year; all others write for quote CSCL 01B

Selected aircraft accident reports in brief format occurring in U.S. civil and foreign aviation operations during calendar year 1985 are given. Approximately 200 general aviation and air carrier accidents contained in the publication represent a random selection. GRA

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Space Communications, Spacecraft Communications, Command and Tracking* and *32 Communications and Radar.*

N87-15197*# Boeing Commercial Airplane Co., Seattle, Wash.
AN EVALUATION OF DESCENT STRATEGIES FOR TNAV-EQUIPPED AIRCRAFT IN AN ADVANCED METERING ENVIRONMENT
K. H. Izumi, R. W. Schwab, J. L. Groce, and M. A. Coote [1986] 80 p
(Contract NAS1-17635)
(NASA-CR-178093; NAS 1.26:178093; D6-53153) Avail: NTIS HC A05/MF A01 CSCL 17G

Investigated were the effects on system throughput and fleet fuel usage of arrival aircraft utilizing three 4D RNAV descent strategies (cost optimal, clean-idle Mach/CAS and constant descent angle Mach/CAS), both individually and in combination, in an advanced air traffic control metering environment. Results are presented for all mixtures of arrival traffic consisting of three Boeing commercial jet types and for all combinations of the three descent strategies for a typical en route metering airport arrival distribution. Author

N87-15198# Federal Aviation Administration, Washington, D.C. ATCRBS Analysis Team.
AIR TRAFFIC CONTROL RADAR BEACON SYSTEM TRANSPONDER PERFORMANCE STUDY AND ANALYSIS. VOL. 1: TRANSPONDER TEST METHODOLOGY RESULTS, ANALYSIS AND RECOMMENDATIONS Final Report
Sep. 1986 43 p
(DOT/FAA/FS-86/1.1-Vol-1) Avail: NTIS HC A03/MF A01

The description and results of the Air Traffic Control Radar Beacon System (ATCRBS) Transponder Study and Analysis are given. This study represents a two year effort consisting of testing, data collection, and analysis of air carrier, military, and general aviation transponder performance. The ATCRBS Analyis Team developed a comprehensive test plan which included a validation flight test program, an evaluation of transponder maintenance and calibration programs, and a detailed analysis of general aviation transponder performance. The study was concentrated in the Atlanta, Georgia area. However, data was collected from many parts of the country. The Mobile Transponder Performance Analyzer (MTPA), developed by the FAA Technical Center, was dispatched to field locations in order to support the data collection and analysis tasks. This effort resulted in identifying a trend of problems associated with the general aviation transponder. Author

N87-15199# Department of the Army, Washington, D. C.
AIRCRAFT COLLISION WARNING SYSTEM Patent Application
Raymond W. Conrad, inventor (to Army) Filed 15 Aug. 1986 13 p
(AD-D012463; US-Patent-Appl-SN-896788) Avail: NTIS HC A02/MF A01 CSCL 01/4

An aircraft collision warning system is described in which a low power pulsed laser system projects narrow bandwidth radiation into 4 pi steradians around an aircraft and a matched, narrow bandwidth receiver system, with a 4 pi steradian field-of-view which detects such radiation emitted from another aircraft within range of the receiver and activates appropriate warning. GRA

N87-15200# General Accounting Office, Washington, D. C. Information Management and Technology Div.
AIR TRAFFIC CONTROL: FAA's (FEDERAL AVIATION ADMINISTRATION's) ADVANCED AUTOMATION SYSTEM ACQUISITION STRATEGY IS RISKY
Jul. 1986 41 p
(PB86-231743; GAO/IMTEC-86-24; B-206887) Avail: NTIS HC A03/MF A01 CSCL 17G

Evaluation shows that FAA's current acquisition strategy for the Advanced Automation System does not adequately mitigate technical risks and does not provide for suitable operational simulation of the advanced automation features before the Department of Transportation commits to the multi-billion-dollar contract for full production. In addition, it is shown that the Advanced Automation System, as currently planned, may not be economically justified. FAA's congressionally mandated benefit/cost analysis, recently initiated and scheduled for completion late next year, should provide more information on the issue. GRA

N87-15386# Centre National d'Etudes Spatiales, Toulouse (France).
THE LOCSTAR SATELLITE RADIOPOSITIONING SYSTEM [LE SYSTEME LOCASTAR DE RADIO-FREQUENCE PAR SATELLITE]
D. Hernandez *In* ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 115-118 In FRENCH
(For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.* For land transportation vehicles see *85 Urban Technology and Transportation.*

N87-15201 Maryland Univ., College Park.
DYNAMIC STABILITY OF HINGELESS AND BEARINGLESS ROTOR BLADES IN FORWARD FLIGHT Ph.D. Thesis
Brahmananda Panda 1985 183 p

Avail: Univ. Microfilms Order No. DA8608844

The aeroelastic stability of hingeless and bearingless rotor blades in forward flight is examined. Two types of structural modeling are used; a spring-restrained hinged model and a elastic beam model. With a hinged model, the blade is assumed to undergo three degrees of motion; rigid body flap, lag, and feather rotations about hinges at the blade root, with hinge springs to obtain arbitrary natural frequencies. Quasisteady strip theory is used to evaluate the aerodynamic forces and the unsteady aerodynamics effects are introduced approximately through a dynamic wake induced inflow modelling. The nonlinear time dependent periodic blade response is calculated using an iterative procedure based on Floquet theory. The periodic perturbation equations are solved for stability using Floquet transition matrix theory as well as constant coefficient approximation in the fixed reference frame. Results are presented for both soft-inplane and stiff-inplane blade configurations and the effects of several parameters on blade stability are examined. For an elastic hingeless model, the blade is assumed to undergo flap bending, lag bending and torsional deflections. A finite element formulation based on Hamilton's principle is used. Dissert. Abstr.

N87-15202 Texas Univ., Austin.
MAXIMUM-TERMINAL-VELOCITY GUIDANCE FOR A HYPERSONIC GLIDER Ph.D. Thesis
Gerald Richard Eisler 1986 176 p
Avail: Univ. Microfilms Order No. DA8618456

Several optimal control problems for atmospheric maximum-terminal-velocity (MTV) guidance of a hypersonic glider are solved. These solutions result in feedback control laws used to guide a skid-to-turn vehicle. To derive these laws, approximations are made to the differential equations of motion to generate various integrable systems. These systems allow for the rapid and repetitive computation of guidance commands. Of particular importance is the assumption of Loh's term being constant to approximate centrifugal and gravitational effects in the flight path angle equation. The solutions of the optimal control problems depend on a variety of standard elliptic integrals. Two of these problems, the constant-altitude turn (CAT) and the unconstrained-range and heading (URH) descent to the ground, employ partial final position constraints. Control laws are derived for each problem and used to compute trajectories analytically. The results are compared with those of a parameter optimization code (VFO2AD) which generates lift and side force approximations to the true optimals for the respective problems. Agreement between the analytic solutions and the approximate, true optimals is excellent. Simulation comparisons for these approximate optimals are made with a representative proportional-navigation scheme flying a similarly-segmented trajectory. The results indicate a substantial improvement of the approximate optimal over the proportional scheme. Dissert. Abstr.

N87-15203# Royal Aircraft Establishment, Farnborough (England).
THE DYNAMIC SCALING AND DEVELOPMENT OF MODEL HELICOPTER ROTOR BLADES FOR THE RAE 24FT WIND TUNNEL TEST RIG
C. Hatch May 1985 27 p
(RAE-TR-85052; RAE-Mat/Struct-128; BR97932; ETN-86-98373)
Avail: NTIS Avail: NTIS HC A03/MF A01

The design considerations for scale model helicopter rotors for wind tunnel testing are discussed. The laws governing the scaling of dynamic characteristics, in terms of loads, vibration modes and displacements, are derived, and generalized to include the case of unequal scaling of span and chord. For tests in a 24ft wind tunnel, dynamically scaled blades based on a composite D-spar construction were used. The design and dynamic characteristics of these blades is described. Blades with a significantly lower torsional stiffness are needed; results of experiments to modify the existing blades, by changes to the D-spar, show that this type of construction is unsuited to future requirements. An alternative construction method, based on a CFRP inner spar, rigid foam fairing and GFRP skin, is shown to have the versatility to meet the requirements for dynamically scaled blades. ESA

N87-15204# Battelle Columbus Labs., Ohio.
HANDBOOK. VOLUME 1: VALIDATION OF DIGITAL SYSTEMS IN AVIONICS AND FLIGHT CONTROL APPLICATIONS
Ellis F. Hitt, Donald Eldredge, Jeff Webb, Charles Lucius, and Michael S. Bridgman 1986 516 p Sponsored by FAA
(DOT/FAA/CT-82/115-Vol-1-Rev) Avail: NTIS HC A22/MF A01

Techniques, methodologies, tools, and procedures are identified in a systems context that is applicable to aspects of the validation and certification of digital systems at specific times in the development, and implementation of software based digital systems to be used in flight control/avionics applications. The application of these techniques in the development of discrete units and/or systems will result in completion of a product or sytem which is verifiable and can be validated in the context of the existing regulations/orders of the government regulatory agencies. A systems engineering approach is used to implement and test the software and hardware during the design, development, and implementation phase. The handbook also recognizes and provides for the evaluation of the pilot workload in the utilization of the new control/display technology, especially when crew recognition and intervention may be necessary to cope with/recover from the effects of faults or failures in the digital systems or the crew introduces errors into the system under periods of high workload due to some inadvertent procedure or entry of incorrect or erroneous data. B.G.

N87-15205*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INTERDISCIPLINARY AND MULTILEVEL OPTIMUM DESIGN
Jaroslaw Sobieszczanski-Sobieski and Raphael T. Haftka Dec. 1986 49 p Presented at the NATO Advanced Study Inst. on Computer Aided Optimal Design, Troia, Portugal, Jul. 1986
(NASA-TM-89077; NAS 1.15:89077) Avail: NTIS HC A03/MF A01 CSCL 01C

Interactions among engineering disciplines and subsystems in engineering system design are surveyed and specific instances of such interactions are described. Examination of the interactions that a traditional design process in which the numerical values of major design variables are decided consecutively is likely to lead to a suboptimal design. Supporting numerical examples are a glider and a space antenna. Under an alternative approach introduced, the design and its sensitivity data from the subsystems and disciplines are generated concurrently and then made available to the system designer enabling him to modify the system design so as to improve its performance. Examples of a framework structure and an airliner wing illustrate that approach. Author

N87-15206# Analytic Services, Inc., Arlington, Va.
THE UNMANNED AIR RECONNAISSANCE SYSTEM Tactical Division Note, Jan. - Jun. 1986
Robert B. Piper and Benjamin Glatt Aug. 1986 36 p Presented at the 13th Annual Association for Unmanned Vehicle Systems (AUVS) Symposium, Arlington, Va., 21 Jul.
(Contract F49620-86-C-00047)
(AD-A171165; ANSER-TDN-86-2) Avail: NTIS HC A03/MF A01 CSCL 01/3

The study took a cursory look at the experience in Vietnam with Unmanned Reconnaissance Systems, identified deficiencies, and proposed a generic unmanned system for the next generation of reconnaissance vehicles. The study concluded that: the technology exists today to produce an unmanned reconnaissance system that could operate effectively against fixed targets. The UARS could have a day/night under-the-weather capability and provide near-real-time intelligence. Overview: Cursory Look at Vietnam Experience; Deficiencies in Reconnaissance RPVs; Generic Unmanned Air Reconnaissance Vehicle (UARV); UARV Missions and Concept of Operations; Data Rates; Data Link; Generic Data-Link Cost; Cost Effectiveness; Conclusions. GRA

N87-15207# Esprit Technology, Inc., Walnut Creek, Calif.
SMALL, SELF-CONTAINED AIRCRAFT FATIGUE DATA RECORDER Final Report, Oct. 1985 - Aug. 1986
Philip Flanner Aug. 1986 164 p

(Contract N62269-85-C-0716)
(AD-A172400) Avail: NTIS HC A08/MF A01 CSCL 20/11

Because of aging airframes and more severe mission requirements, the need to monitor structural fatigue damage on military aircraft has become critical. It is particularly important to be able to study the dynamic loads in remote locations such as the vertical tail, wing spar, landing gear, etc. However, there is presently no small, battery-operated data recorder available to investigate fatigue characteristics at these localized stress hot spots. Having available a miniature data-logger that could be easily attached to any desired location on an aircraft will enable engineers to quickly examine, and correct, the cause of fatigue cracks and similar structural problems. The purpose of this program was to investigate the feasibility of utilizing the latest technology in low-power circuitry, transducers and packaging to produce a small, rugged, self-contained fatigue recorder, requiring no tie-in to aircraft wiring for installation. The project stages included: feasibility study, design evaluation, submittal of an interim report, and culminated in the design layout and construction of a brassboard demonstration unit. This feasibility demonstrator is a single channel device connected to an internal accelerometer and includes a means for automatically activating the micro-processor circuitry by sensing the vibration associated with the start-up and operation of the aircraft's engines. Size of the ultimate unit is targeted at 8 cubic inches. GRA

N87-15161# Messerschmitt-Boelkow-Blohm G.m.b.H., Bremen (West Germany). Unternehmensbereich Transport-und Verkehrsflugzeuge.
PROBLEMS OF THE APPLICATION OF WIND TUNNEL RESULTS TO AERODYNAMIC PERFORMANCE OF LARGE AIRCRAFT
R. Hilbig *In* ESA Boundary Layer Control by Transition Fixing (ESA-TT-909) Oct. 1985 p 7-16 Transl. into ENGLISH from "Grenzxchichtsteverung durch Transitionsfixierung" rept. DFVLR-Mitt-84-17 DFVLR, Goettingen, West Germany, Sep. 1984 Original language document was announced as N85-23713 (For primary document see N87-15160 07-01)
Avail: NTIS HC A07/MF A01; original German version available from DFVLR, Cologne, West Germany DM 39

N87-15162# Messerschmitt-Boelkow-Blohm G.m.b.H., Bremen (West Germany). Unternehmensbereich Transport-und Verkehrsflugzeug
BOUNDARY LAYER TRANSITION CONTROL FOR TAKEOFF AND LANDING CONFIGURATIONS
H. P. Franz *In* ESA Boundary Layer Control by Transition Fixing (ESA-TT-909) Oct. 1985 p 17-31 Transl. into ENGLISH from "Grenzschichtsteverung durch Transitionsfixierung" rept. DFVLR-Mitt-84-17 DFVLR, Goettingen, West Germany, Sep. 1984 Original language document was announced as N85-23714 (For primary document see N87-15160 07-01)
Avail: NTIS HC A07/MF A01; original German version available from DFVLR, Cologne, West Germany DM 39

N87-15163# National Aerospace Lab., Amsterdam (Netherlands).
EXPERIENCES WITH TRANSITION FIXING IN THE HIGH SPEED REGIME AT NLR, NETHERLANDS
A. Elsenaar *In* ESA Boundary Layer Control by Transition Fixing (ESA-TT-909) Oct. 1985 p 33-56 Transl. into ENGLISH from "Grenzschichtsteverung durch Transitionsfixierung" rept. DFVLR-Mitt-84-17 DFVLR, Goettingen, West Germany, Sep. 1984 Original language document was announced as N85-23715 (For primary document see N87-15160 07-01)
Avail: NTIS HC A07/MF A01; original German version available from DFVLR, Cologne, West Germany DM 39

N87-15164# Messerschmitt-Boelkow-Blohm G.m.b.H., Bremen (West Germany). Unternehmensbereich Transport-und Verkehrsflugzeuge.
TRANSITION FIXING IN THE HIGH SPEED RANGE FOR THE DEVELOPMENT OF CIVIL AIRCRAFT WINGS
W. Burgsmueller *In* ESA Boundary Layer Control by Transition Fixing (ESA-TT-909) Oct. 1985 p 55-79 Transl. into ENGLISH from "Grenzschichtsteverung durch Transitionsfixierung" rept. DFVLR-Mitt-84-17 DFVLR, Goettingen, West Germany, Sep. 1984 Original language document was announced as N85-23716 (For primary document see N87-15160 07-01)
Avail: NTIS HC A07/MF A01; original German version available from DFVLR, Cologne, West Germany DM 39

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

No abstracts in this category.

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and onboard auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N87-15208# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
CONVECTIVE HEAT TRANSFER AND FILM COOLING IN TURBOMACHINERY
1986 499 p Lecture Series held in Rhode-Saint-Genese, Belgium, 21-25 Apr. 1986
(VKI-LS-1986-06; ETN-87-98320) Avail: NTIS HC A21/MF A01

Experimental results obtained under correctly simulated main stream conditions in an annular geometry, for stationary as well as rotating blade rows, with and without film cooling; gas turbine projects involving unsteady heat transfer concepts and film cooling; hydrodynamic effects associated with film cooling; unsteady effects on convective heat transfer in linear cascades; simulation of turbulence and transition; and modeling of film cooling were discussed. For individual titles, see N87-15209 through N87-15222.

N87-15209*# Calspan Corp., Buffalo, N. Y. Physical Sciences Dept.
EXPERIMENTAL SHORT-DURATION TECHNIQUES
Michael G. Dunn *In* Von Karman Inst. for Fluid Dynamics Convective Heat Transfer and Film Cooling in Turbo Machinery 1986 44 p Sponsored by NASA Lewis Research Center, the Naval Air Propulsion Center, the Cornell Aeronautical Lab., and the Arvin Calspan Internal Research and Development Funds (For primary document see N87-15208 07-07)
Avail: NTIS HC A21/MF A01 CSCL 81D

Short-duration facilities used for gas turbine studies are described. Data recording techniques; and instruments (thin-film heat flux gages, high-frequency response pressure measurements, total temperature probes, measurement of rotor tip speed, active measurement of tip clearance) are presented. ESA

N87-15210# Calspan Corp., Buffalo, N. Y. Physical Sciences Dept.
GARRETT TFE-731 hp TURBINE STAGE WITHOUT AND WITH COOLING-GAS INJECTION
Michael G. Dunn *In* Von Karman Inst. for Fluid Dynamics Convective Heat Transfer and Film Cooling in Turbo Machinery 1986 36 p (For primary document see N87-15208 07-07)
Avail: NTIS HC A21/MF A01

Local heat flux on the stage of a low aspect ratio rotating

turbine was measured at realistic flow conditions. Results on the vane and on the blade, without and with NGV injection of coolant gas are presented. The influence of the presence of the rotor on the vane heat-flux distribution is illustrated. Rotor tip and stationary shroud heat-flux distributions as a function of tip/shroud clearance are discussed. The NGV distributions in the absence of injection were compared with flat-plate and STAN 5 predictions. The turbulent flat-plate prediction gives a reasonably good comparison with the data on the pressure surface. On the suction surface, the turbulent flat-plate prediction is conservative, but by a reasonable amount. Over both surfaces of the blade in the absence of upstream injection, reasonable agreement between the data and one or more of the predictions can be demonstrated. ESA

N87-15211# Calspan Corp., Buffalo, N. Y. Physical Sciences Dept.
LOW ASPECT RATIO TURBINE STAGE WITHOUT COOLING-GAS INJECTION
Michael G. Dunn *In* Von Karman Inst. for Fluid Dynamics Convective Heat Transfer and Film Cooling in Turbo Machinery 1986 p 27 p (For primary document see N87-15208 07-07)
Avail: NTIS HC A21/MF A01

Heat flux measurements for a gas turbine stage were used to calculate a Stanton number based on inlet flow conditions. Values of the inlet Stanton number for the meanline beginning at the leading edge of the NGV and continuing to near the trailing edge of the blade are presented. The peak meanline value for the vane occurs at 2% wetted distance on the pressure surface side. Boundary layer transition occurs at 6% wetted distance on the suction surface side of the vane. The pressure surface boundary layer is turbulent from near the leading edge all the way to the trailing edge. For the blade, the peak Stanton number occurred at approximately 3.5% wetted distance on the pressure surface. ESA

N87-15212# Calspan Corp., Buffalo, N. Y. Physical Sciences Dept.
TIME-RESOLVED HEAT FLUX MEASUREMENT FOR THE ROTOR BLADE OF A TFA-731-2 hp TURBINE
Michael G. Dunn *In* Von Karman Inst. for Fluid Dynamics Convective Heat Transfer and Film Cooling in Turbo Machinery 1986 39 p (For primary document see N87-15208 07-07)
Avail: NTIS HC A21/MF A01

An analysis technique and its application using typical data for time-resolved heat flux measurements on the blade of a full-stage rotating turbine is presented. The magnitude of fluctuations in the heat flux value remain significant over the entire suction surface. The magnitude of the fluctuation is largest over the forward portion of the blade and decreases as the trailing edge is approached. However, relative to the time averaged heat flux values at this downstream location, the magnitude of the fluctuations is significant. A fast Fourier transformation analysis of the time-resolved heat flux demonstrates the presence of peaks at the fundamental and first harmonic of the wake cutting frequency. The frequency spectra also demonstrate the presence of energy at frequencies other than wake cutting. ESA

N87-15213# Texas Univ., Austin. Dept. of Mechanical Engineering.
SIMULATION CODES FOR CALCULATION OF HEAT TRANSFER TO CONVECTIVELY-COOLED TURBINE BLADES
Michael E. Crawford *In* Von Karman Inst. for Fluid Dynamics Convective Heat Transfer and Film Cooling in Turbo Machinery 1986 33 p Sponsored by the Heinemann Foundation, Texas Univ., NSF, and the Garrett Turbine Engine Co. (For primary document see N87-15208 07-07)
Avail: NTIS HC A21/MF A01

A mathematical and numerical model for flows over turbomachinery airfoils, including turbulence closure models, is presented. The simulation program is a finite difference code that solves the parabolic differential equations that govern two dimensional boundary layer flows. The equations are the time-averaged continuity equation and the boundary layer form of momentum equation, stagnation enthalpy equation and turbulence model equations that govern steady, two dimensional Newtonian flow. The equations and boundary conditions are solved in a semi-implicit manner, with integration starting at any nonsingular location, and continuing provided the wall shear stress does not become zero. As a minimum, the program solves the momentum and continuity equations, but it can also handle any number of additional transport equations. ESA

N87-15214# Texas Univ., Austin. Dept. of Mechanical Engineering.
ON THE NEED TO BENCHMARK SIMULATION CODES c34
Michael E. Crawford *In* Von Karman Inst. for Fluid Dynamics Convective Heat Transfer and Film Cooling in Turbo Machinery 1986 39 p (For primary document see N87-15208 07-07)
Avail: NTIS HC A21/MF A01

A preprocessor to create initial profiles for use with TEXSTAN finite difference two dimensional boundary layer code was developed. It is a multifaceted routine to support the various external and internal flows that can be simulated. It requires external curve fitting routines to smooth the data. ESA

N87-15215# Texas Univ., Austin. Dept. of Mechanical Engineering.
SIMULATING THE EFFECTS OF CURVATURE, FREE STREAM TURBULENCE, AND TRANSITION c34
Michael E. Crawford *In* Von Karman Inst. for Fluid Dynamics Convective Heat Transfer and Film Cooling in Turbo Machinery 1986 34 p (For primary document see N87-15208 07-07)
Avail: NTIS HC A21/MF A01

Attempts to simulate a three-dimensional flow around turbine blades (excluding the film cooling) with a two dimensional, stochastic model of the turbulence problem are reviewed. The change in surface shear stress and heat transfer caused by convex and concave blade curvature is described. Increase in surface heat and friction due to a turbulent free-stream above a laminar or turbulent boundary layer is outlined. Laminar to turbulent boundary layer transition measurement, linear stability analysis, and turbulence modeling are discussed. ESA

N87-15216# Texas Univ., Austin. Dept. of Mechanical Engineering.
SIMULATION CODES FOR CALCULATION OF HEAT TRANSFER TO FILM-COOLED TURBINE BLADES
Michael E. Crawford *In* Von Karman Inst. for Fluid Dynamics Convective Heat Transfer and Film Cooling in Turbo Machinery 1986 29 p (For primary document see N87-15208 07-07)
Avail: NTIS HC A21/MF A01

Differential analytical techniques for simulating film cooling of turbine blades are reviewed. Discrepancies between predictions and measurements are discussed. The STANCOOL model is presented. Tests with double and single rows of holes are described. ESA

N87-15217# National Aerospace Lab., Tokyo (Japan). Aero-Engine Div.
EXPERIMENTAL AND THEORETICAL APPROACHES USED AT THE NATIONAL AEROSPACE LABORATORY IN JAPAN
Toyoaki Yoshida *In* Von Karman Inst. for Fluid Dynamics Convective Heat Transfer and Film Cooling in Turbo Machinery 1986 28 p (For primary document see N87-15208 07-07)
Avail: NTIS HC A21/MF A01

Infrared temperature measurement techniques and computer graphics used to study heat transfer on film cooled turbine blades are described. Application of an infrared thermal camera to flat plate test models, cascade test models, and hot cascade test models is presented. Use of the computer graphics system to study mass transfer near film cooling holes and for turbine vane exit flow measurements is summarized. ESA

N87-15218# National Aerospace Lab., Tokyo (Japan).
THE NATIONAL GAS TURBINE PROJECTS IN JAPAN. THE FJR-710 TURBOFAN ENGINE PROJECT. THE ADTJ-100 HIGH

EFFICIENT GAS TURBINE PROJECT
Toyoaki Yoshida *In* Von Karman Inst. for Fluid Dynamics Convective Heat Transfer and Film Cooling in Turbo Machinery 1986 16 p (For primary document see N87-15208 07-07)
Avail: NTIS HC A21/MF A01

Drawings and photographs of a turbofan engine, a quiet airplane, and a gas turbine test laboratory are presented. ESA

N87-15219# Royal Military Coll. of Science, Shrivenham (England). Dept. of Mechanical Engineering.
HYDRODYNAMICS OF FILM COOLING **c34**
A. Brown *In* Von Karman Inst. for Fluid Dynamics Convective Heat Transfer and Film Cooling in Turbo Machinery 1986 55 p (For primary document see N87-15208 07-07)
Avail: NTIS HC A21/MF A01

The fluid mechanics of film cooling of gas turbine blades is reviewed. It is advisable to remain with loss coefficients and modify them according to geometry and coolant supply and exhaust conditions. There is published data on loss coefficients which is very relevant to film cooling holes. Using loss coefficients in a network approach remains a useful design tool. The greatest omission is that nowhere is the effect of rotation relevant to rotor blades mentioned, although work is being undertaken on the effects of rotation on the hydrodynamics of film cooling holes. ESA

N87-15220# Oxford Univ. (England). Dept. of Engineering Science.
UNSTEADY AERODYNAMIC AND HEAT TRANSFER PROCESSES IN A TRANSONIC TURBINE STAGE
D. L. Schultz *In* Von Karman Inst. for Fluid Dynamics Convective Heat Transfer and Film Cooling in Turbo Machinery 1986 32 p (For primary document see N87-15208 07-07)
Avail: NTIS HC A21/MF A01

Heat transfer rates and a range of pressures were measured on a highly loaded rotor profile for which the NGV exit flow included strong trailing edge shock waves. It was possible to vary the blade incidence and thus to examine its effect associated with rotor-wake interaction. A set of steady-state (i.e., no wake interaction), heat transfer, and aerodynamic data is presented. One of the most significant transient effects associated with wake blade interaction is the reduction in flow incidence angle. It is demonstrated that there is a substantial reduction in heat transfer rate over the whole of the suction surface which begins at x/s = 20%. The strong shock waves generated by the wake-producing bar when moving at the correct relative velocity has a profound effect on heat transfer rate. ESA

N87-15221# Oxford Univ. (England). Dept. of Engineering Science.
THE EFFECT OF WAKE PASSING ON TURBINE BLADES
D. L. Schultz *In* Von Karman Inst. for Fluid Dynamics Convective Heat Transfer and Film Cooling in Turbo Machinery 1986 47 p (For primary document see N87-15208 07-07)
Avail: NTIS HC A21/MF A01

A mechanical device was designed to study the effect of wake-passing on the heat transfer and aerodynamic performance of a typical turbine engine blade in the laboratory. Using high frequency instrumentation and spark Schlieren flow visualization techniques, a comprehensive set of measurements was obtained. The experiments show that the response of the laminar blade-boundary layer to wake-passing results in an unsteady transition fundamentally different from that occurring in steady or even quasi-steady flow. The velocity and turbulence fluctuations are large. ESA

N87-15222# Oxford Univ. (England). Dept. of Engineering Science.
THE SCALING OF FILM COOLING: THEORETICAL AND EXPERIMENTAL RESULTS
T. V. Jones and C. J. P. Forth *In* Von Karman Inst. for Fluid Dynamics Convective Heat Transfer and Film Cooling in Turbo Machinery 1986 31 p (For primary document see N87-15208 07-07)
Avail: NTIS HC A21/MF A01

The manner in which the gas enters the freestream and the manner in which the freestream gas is entrained in the coolant film on turbine blades are considered. An ideal analysis of the injection process enables the conditions immediately after injection to be estimated and these serve as the starting point for the entrainment. A distance scale based on the momentum flux of the coolant after it enters the flow (i.e., in the coolant film) proves very useful for correlating the data at different distances downstream from injection. Experiments conducted over a wide range of coolant to freestream temperature ratios, and hence density ratios, show that the momentum flux at injection is solely a function of the pressure difference ratio and is independent of the density ratio for the Reynolds numbers tested. ESA

N87-15223# Stuttgart Univ. (West Germany). Sonderforschungsbereich 85.
THERMODYNAMIC AND FLOW MECHANICAL PROBLEMS IN AIRCRAFT AND SPACECRAFT DRIVES. SUMMARY OF CONFERENCE REPORTS FOR 1974, 1975, 1976 [THERMODYNAMISCHE UND STROEMUNGSMECHANISCHE PROBLEME DER LUFT- UND RAUMFAHRTANTRIEBE, SEMINARBERICHT 1974-75-76]
2 Aug. 1976 141 p Partly in ENGLISH and GERMAN
(ETN-87-98750) Avail: NTIS HC A07/MF A01

Spatial supersonic flow through annular cascades; the applicability of the axisymmetric model in the prediction of supersonic flow through annular cascades; and a simple concept for the computation of steady supersonic flow with supply of heat are discussed. The application of laser Raman spectroscopy for local temperature measurements in flames is considered. Turboengines, turborockets, and turboramjet engines are compared for long range and high Mach numbers. Air breathing jet engines for satellite launchers; and integrated turboramjet-rocket hybrid propulsion systems are analyzed. A smoothing procedure for the calculation of flow fields from interferometric measurements is presented. For individual titles, see N87-15224 through N87-15228. ESA

N87-15224# Stuttgart Univ. (West Germany). Inst. fuer Aerodynamik und Gasdynamik.
A SIMPLE CONCEPT FOR THE COMPUTATION OF STEADY SUPERSONIC FLOW WITH SUPPLY OF HEAT **c02**
K. Foerster *In its* Thermodynamic and Flow Mechanical Problems in Aircraft and Spacecraft Drives. Summary of Conference Reports for 1974, 1975, 1976 2 Aug. 1976 p 16-23 Presented at GAMM-Fachausschusses fuer Numerische Methoden in der Stroemungsmechanik, Porz-Wahn, West Germany, 8-10 Oct. 1975 Sponsored by Deutsches Forschungsgemeinschaft (For primary document see N87-15223 07-07)
Avail: NTIS HC A07/MF A01

The configuration of a thin flame layer along the surface of a body was considered for the analysis of flow with fuel addition, in order to predict or control the rate of heat production. The supersonic inviscid non-heat-conducting flow along a given contour is composed by an adiabatic outer flow layer adjacent to the wall into which heat is added; this heat layer is taken as thin to allow it to be treated as a one-dimensional stream tube. The three conservation equations for plane steady homenthalpic flow were transformed to a special streamline coordinate system. The derivatives were approximated by finite differences and the resulting equations were solved by a modified Lax-Wendroff-Richtmeyer algorithm for a step given by a Courant-Friedrichs-Lewy conditon. The stability condition is invariant against the transformation used. ESA

N87-15225# Stuttgart Univ. (West Germany).
COMPARISON OF TURBOENGINE, TURBOROCKET, AND TURBOJET ENGINE AS PROPULSION FOR LONG RANGE AND HIGH MACH NUMBERS [VERGLEICH VON TURBOTRIEBWERK, TURBORAKETE UND STAUSTRAHLTRIEBWERK ALS ANTRIEB BEI GROSSEN REICHWEITEN UND HOHEN MACHZAHLEN]
Egbert Riester *In its* Thermodynamic and Flow Mechanical

Problems in Aircraft and Spacecraft Drives. Summary of Conference Reports for 1974, 1975, 1976 2 Aug. 1976 p 34-62 In GERMAN (For primary document see N87-15223 07-07)
Avail: NTIS HC A07/MF A01

The turboengine, turborocket and turboramjet engine were compared for the propulsion of flying devices with large flying range in the Mach number range between 2 and 4. Specific momentum, thrust characteristics, and air resistance were considered. It is shown that the turboengine is the most favorable type of propulsion for aircraft for Mach numbers of up to 3.5. Above this value, the turboramjet engine is the most favorable, and the turborocket interesting due to its high thrust density and in spite of its high specific momentum. For the turborocket, questions with respect to the gas generator, the turbine operation, the exhaust composition, and the exhaust mixture have to be investigated. For missiles, the turboramjet engine and the turborocket are favorable from a Mach number of 2 to 2.5. ESA

N87-15226# Stuttgart Univ. (West Germany).
AIR BREATHING JET ENGINES FOR SATELLITE LAUNCHER VEHICLES. ANALYSIS AND COMPARISON OF SUITABLE PROPULSION CONCEPTS [LUFTATMENDE STRAHLANTRIEBE FUER RAUMFAHRZEUGTRAEGER. ANALYSE UND VERGLEICHENDE GEGENUEBERSTELLUNG GEEIGNETER ANTRIEBSKONZEPTE]
H. Kuenkler *In its* Thermodynamic and Flow Mechanical Problems in Aircraft and Spacecraft Drives. Summary of Conference Reports for 1974, 1975, 1976 2 Aug. 1976 p 63-96 In GERMAN (For primary document see N87-15223 07-07)
Avail: NTIS HC A07/MF A01

The requirements for air breathing engines used as a booster stage in a satellite launcher vehicle, and the limitations to the application of turboengines are discussed. The measures to shift these limits to higher flight Mach numbers are explained. It is shown that the precoding of the inlet air current prior to compression is a suitable way to extend substantially the Mach number range. The problems with the heat exchanger are largely solved after the development of suitable mold types. Nevertheless, besides the variable inlet, the heat exchanger represents a main point of development effort. ESA

N87-15227# Stuttgart Univ. (West Germany). Inst. fuer Raimfahrtantriebe.
INTEGRATED TURBORAMJET-ROCKET PERFORMANCE POTENTIAL: PROJECT ITUSTRA
Peter A. Kramer and Rolf D. Buehler *In its* Thermodynamic and Flow Mechanical Problems in Aircraft and Spacecraft Drives. Summary of Conference Reports for 1974, 1975, 1976 2 Aug. 1976 p 98-123 Presented at 3rd International Symposium on Air Breathing Engines, Munich, West Germany, 7-12 Mar. 1986 Sponsored in part by Deutschen Forschungsgemeinschaft (For primary document see N87-15223 07-07)
(Grant DA-ERO-75-G001)
(ICAS-DGLR-76-045) Avail: NTIS HC A07/MF A01

The performance potential of a group of rocket air-breathing hybrid propulsion systems was compared with the performance parameters of simple or pure propulsion systems. A general numerical comparison method which uses a series of subprograms for the various system components was developed. The pure propulsion systems were calculated as limit cases of the general hybrid system with the same programs and assumptions. The emphasis was on the aerothermodynamic design performance analysis of hybrid systems with subsonic internal flow. Typical performance curves are given for a wide range of flight conditions. It is shown that the air-turbo-rocket cycle is probably the most promising for the first phase of the high thrust trajectory single-stage space transporter. The second propulsion phase favors the ramjet mode although the competitive ramjet-rocket mode has to be considered. The final operation mode has to be that of the rocket. The separate propulsion components for these operation modes could be integrated into a single system. ESA

N87-15228# Stuttgart Univ. (West Germany).
PROBLEMS OF THE COMPENSATION CALCULATION FOR THE INTERFEROMETRY OF SPATIAL FLOWS [PROBLEME DER AUSGLEICHSRECHNUNG BEI DER INTERFEROMETRIE RAEUMLICHER STROEMUNGEN] c02
W. Schmidt *In its* Thermodynamic and Flow Mechanical Problems in Aircraft and Spacecraft Drives. Summary of Conference Reports for 1974, 1975, 1976 2 Aug. 1976 p 124-135 In GERMAN (For primary document see N87-15223 07-07)
Avail: NTIS HC A07/MF A01

A smoothing procedure for the calculation of flow fields from two-dimensional interferometric measuring data is presented. The programming uses FORTRAN routines and is not very difficult. The computation times using a CDC 6600 times are between 60 and 80 sec depending on the number or curves to be smoothed. A preliminary knowledge of the flow field is necessary in order to estimate the choice of smoothing parameters and the number of iteration steps. The choice of spline functions is meaningful for such cases where no idea exists about the equation of a smoothing curve. In any case the calculation has to be checked with intermediate steps if the predetermined values indicate an unfavorable distribution. ESA

N87-15229# Naval Research Lab., Washington, D. C.
NUMERICAL SIMULATIONS OF THE FLOWFIELD IN A CENTRAL-DUMP RAMJET COMBUSTOR. PART 1: TEST OF THE MODEL AND EFFECTS OF FORCING
K. Kailasanath, J. Gardner, J. Boris, and Elaine Oran 31 Jul. 1986 35 p
(AD-A170936; NRL-MR-5832) Avail: NTIS HC A03/MF A01 CSCL 21/5

This paper presents results of numerical simulations of the cold flow in a central dump ramjet combustor. Tests of the boundary conditions and numerical resolutions are used to perform the simulations. The simulations are used to isolate and study the interaction between acoustic waves and large scale vortex structures. A strong coupling between the acoustic modes of the chamber and large scale vortex structures is observed. The results in the early part of the calculations indicate unforced natural vortex growth near the entrance to the combustor (dump plane) at a frequency close to that of the first longitudinal acoustic mode. With time, the acoustic modes shift the frequency of the most amplified vortex rollup mode near the dump plane into resonance with the acoustic mode. The simulations indicate that the location in space where the modes grow can also be shifted by acoustic forcing. An interesting feature observed in the simulations is a low frequency mode corresponding to the arrival of the merged vortex structures at the choked exit. This mode causes major changes in the merging pattern of the vortices. GRA

N87-15230# Naval Postgraduate School, Monterey, Calif.
AN EXPERIMENTAL INVESTIGATION OF COMBUSTION MODULATION TECHNIQUES FOR A SOLID FUEL RAMJET M.S. Thesis
Stephen R. Lowe Jun. 1986 39 p
(AD-A172322) Avail: NTIS HC A03/MF A01 CSCL 21/2

An experimental investigation was conducted to examine the effects of inlet air swirl and secondary gas injection on the combustion properties in a solid fuel ramjet. Tests were conducted with both HTPB and PMM fuels in order to obtain general results. The swirl tests were conducted at high and low air mass fluxes with equivalence ratios less than unity. Swirl was found effective for increasing the fuel regression rate but the magnitude was highly dependent upon motor geometry, fuel type and operating environment. The gas injection tests included hydrogen at low equivalence ratios, and nitric oxide and nitrous oxide at high equivalence ratios. Secondary injection generally resulted in increases in combustion pressure in agreement with equilibrium, adiabatic combustion expectations. GRA

N87-15231# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AN EXPERIMENTAL INVESTIGATION OF A CIRCULAR THRUST

AUGMENTING EJECTOR M.S. Thesis
Generoso C. Uhuad Dec. 1985 115 p
(AD-A172376; AFIT/GAE/AA/86M-3) Avail: NTIS HC A06/MF A01 CSCL 21/5

A 4.4 in diameter circular ejector was tested to determine the effect on thrust augmentation ratio of the primary nozzle height and injection angle. Also tested were the effects of alternating primary nozzle injection angles, diffuser blowing and suction, inlet cross flow and low primary nozzle exit velocities on thrust augmentation. The results showed that both the primary nozzle injection angle and height affect the maximum thrust augmentation ratio attainable. A small amount of cross flow at the inlet increased the maximum thrust augmentation. The alternating primary nozzle injection angle arrangement did not increase the maximum thrust augmentation above that which was obtained using uniform primary nozzle injection angles. Diffuser blowing or suction did not provide an improvement in the maximum thrust augmentation above that which was obtained without diffuser boundary layer control. Finally, at low primary nozzle exit velocities, thrust augmentation increase as the nozzles were moved out along the inlet surface. The increase in thrust augmentation is attributed to the ability of the flow to remain attached to the inlet surface at low primary nozzle exit velocities thereby increasing the ejector effective mixing chamber length. Author (GRA)

N87-15232# Cincinnati Univ., Ohio. Dept. of Aerospace Engineering and Engineering Mechanics.
STUDY OF PARTICULATED FLOWS AND EROSION IN TURBOMACHINERY Final Report, 14 Dec. 1981 - 30 Jun. 1986
W. Tabakoff Aug. 1986 12 p
(Contract DAAG29-82-K-0029)
(AD-A172965; Rept-86-57; ARO-18560.28-EG) Avail: NTIS HC A02/MF A01 CSCL 21/5

This report summarizes the results of an investigation of the solid particle dynamics and the resulting blade erosion through a helicopter engine with inlet particle separator. The particle trajectories are computed in the inlet separator which is characterized by considerable hub and tip contouring and radial variation in the swirling vane shape. The nonseparated particle trajectories are determined through the deswirling vanes and the five stage axial and one stage radial compressors. The impact data for a very large number of ingested particles is used to calculate the resulting blade surface erosion. The erosion pattern indicates the location of maximum blade erosion. In addition, the effect of high temperature on the erosion rate was determined in an erosion wind tunnel for AM355 steel and Al2O3 ceramics. GRA

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

For related information see also *05 Aircraft Design, Testing and Performance.*

N87-15233 Ohio State Univ., Columbus.
FORMULATION AND MINIMALITY OF NONLINEAR DISCRETE TIME CONTROL SYSTEMS Ph.D. Thesis
Charles Edward Hall, Jr. 1986 107 p
Avail: Univ. Microfilms Order No. DA8618781

At the Aeronautical and Astronautical Research Laboratory of the Ohio State University, experimental investigations of unsteady aerodynamics of airfoils required an apparatus to vary the airflow angle of attack as an arbitrary function of time. A pneumatically driven system was designed, necessitating a nonlinear control system. Here, the digital control methodologies developed to assist in the design are presented. The formulation of the nonlinear discrete time control system from a nonlinear continuous time control system is presented in two different methods; an exact formulation for analytic continuous time systems possessing a finite lengthed Volterra series, and an approximation method based on the Runge-Kutta integration technique. The criteria for nonlinear discrete time observability is derived from the Implicit Function Theorem. The criteria for controllability is based on the geometric interpretation of the Lie algebra used in continuous time system theory. It is then shown that if the continuous time system is both controllable and observable and the discrete time system is observable, then the discrete time system is also controllable.
Dissert. Abstr.

N87-15234*# Calspan Advanced Technology Center, Buffalo, N.Y.
FLARED LANDING APPROACH FLYING QUALITIES. VOLUME 1: EXPERIMENT DESIGN AND ANALYSIS Final Report, Apr. 1985 - Sep. 1986
Norman C. Weingarten, Charles J. Berthe, Jr., Edmund G. Rynaski, and Shahan K. Sarrafian Dec. 1986 200 p Sponsored by NASA
(Contracts NASA Order L-85272-B; F33615-83-C-3603)
(NASA-CR-178188-Vol-1; NAS 1.26:178188-Vol-1; Rept-7205-13-Vol-1) Avail: NTIS HC A09/MF A01 CSCL 01C

An inflight research study was conducted utilizing the USAF Total Inflight Simulator (TIFS) to investigate longitudinal flying qualities for the flared landing approach phase of flight. The purpose of the experiment was to generate a consistent set of data for: (1) determining what kind of commanded response the pilot prefers in order to flare and land an airplane with precision, and (2) refining a time history criterion that took into account all the necessary variables and their characteristics that would accurately predict flying qualities. The result of the first part provides guidelines to the flight control system designer, using MIL-F-8785-(C) as a guide, that yield the dynamic behavior pilots perfer in flared landings. The results of the second part provides the flying qualities engineer with a newly derived flying qualities predictive tool which appears to be highly accurate. This time domain predictive flying qualities criterion was applied to the flight data as well as six previous flying qualities studies, and the results indicate that the criterion predicted the flying qualities level 81% of the time and the Cooper-Harper pilot rating, within + or - 1, 60% of the time.
Author

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tubes; and aircraft engine test stands.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N87-15235*# National Aeronautics and Space Administration, Washington, D.C.
PROCEDURE FOR COMPUTING TRANSONIC FLOWS FOR CONTROL OF ADAPTIVE WIND TUNNELS Ph.D. Thesis - Technischen Univ., Mar. 1986
Rainer Rebstock Jan. 1987 110 p Transl. into ENGLISH of German Thesis Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88530; NAS 1.15:88530) Avail: NTIS HC A06/MF A01 CSCL 14B

Numerical methods are developed for control of three dimensional adaptive test sections. The physical properties of the design problem occurring in the external field computation are analyzed, and a design procedure suited for solution of the problem is worked out. To do this, the desired wall shape is determined by stepwise modification of an initial contour. The necessary changes in geometry are determined with the aid of a panel procedure, or, with incident flow near the sonic range, with a TSP procedure. Author

N87-15236*# National Aeronautics and Space Administration, Washington, D.C.

DIRECT CALCULATION OF WALL INTERFERENCES AND WALL ADAPTATION FOR TWO-DIMENSIONAL FLOW IN WIND TUNNELS WITH CLOSED WALLS
Juergen Amecke Dec. 1986 94 p Transl. into ENGLISH of "Direkte Berechnung von Wandinterferenzen un Wandadaption bei Zweidimensionaler Stroemung in Windkanaelen mit Geschlossenen Waenden" rept. DFVLR, Goettingen, West Germany, Nov. 1985 Original language document was announced as N86-28065 Sponsored by NASA
(NASA-TM-88523; NAS 1.15:88523) Avail: NTIS HC A05/MF A01 CSCL 14B

A method for the direct calculation of the wall induced interference velocity in two dimensional flow based on Cauchy's integral formula was derived. This one-step method allows the calculation of the residual corrections and the required wall adaptation for interference-free flow starting from the wall pressure distribution without any model representation. Demonstrated applications are given. Author

N87-15237*# National Aeronautics and Space Administration, Washington, D.C.
INVESTIGATION OF THE COMPONENTS OF THE NAL HIGH REYNOLDS NUMBER TWO-DIMENSIONAL WIND TUNNEL. PART 4: DESIGN, CONSTRUCTION AND PERFORMANCE OF THE EXHAUST SILENCER
S. Sakakibara, H. Miwa, S. Kayaba, and M. Sato Sep. 1986 51 p Transl. into ENGLISH of rept. TR-606 National Aerospace Lab., Japan, Apr. 1980 Original language document was announced as N81-71756 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-88513; NAS 1.15:88513; TR-606-Pt-4) Avail: NTIS HC A04/MF A01 CSCL 14B

Presented is a description of the design construction and performance of the exhaust silencer for the NAL high Reynolds number two-dimensional transonic blow down wind tunnel, which was completed in October 1979. The silencer is a two-storied construction made of reinforced concrete, 40 m. long, 10 m. wide and 19 m. high and entirely enclosed by thick concrete walls. The upstream part of the first story, particularly, is covered with double walls, the thickness of the two walls being 0.3 m. (inner wall) and 0.2 m. (outer wall), respectively. A noise reduction system using three kinds of parallel baffles and two kinds of lined bends is adopted for the wind tunnel exhaust noise. Author

N87-15238# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Geotechnical Lab.
FACILITIES TECHNOLOGY APPLICATION TESTS: FUEL-RESISTANT PAVEMENT SEALERS Final Report
James E. Shoenberger and Elton R. Brown Aug. 1986 37 p
(AD-A171473; WES-MP-GL-86-19) Avail: NTIS HC A03/MF A01 CSCL 11/1

This report details equipment, personnel, and material requirements as well as procedures used to demonstrate the application of fuel-resistant pavement sealers to asphaltic concrete airfield pavements. The demonstrations took place at Ft. Rucker and Ft. Belvoir. These locations each have asphalt pavements which are continually damaged by fuel spillage. Five sealers were placed at each location. GRA

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N87-15239* National Aeronautics and Space Administration, Washington, D.C.
TECHNOLOGY FOR LARGE SPACE SYSTEMS: A BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 15)
Jan. 1987 161 p
(NASA-SP-7046(15); NAS 1.21:7046(15)) Avail: NTIS HC A08 CSCL 22A

This bibliography lists 594 reports, articles and other documents introduced into the NASA scientific and technical information system between January 1, 1986 and June 30, 1986. Its purpose is to provide helpful information to the researcher, manager, and designer in technology development and mission design according to system, interactive analysis and design, structural and thermal analysis and design, structural concepts and control systems, electronics, advanced materials, assembly concepts, propulsion, and solar power satellite systems. Author

N87-15240# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany).
COLLOQUIUM ABOUT JOINT PROJECTS WITHIN THE DFVLR/ISRO COOPERATION
Jul. 1986 151 p Colloquium held in Cologne, West Germany, 29-30 Oct. 1986
(DFVLR-Mitt-86-16; ISSN-0176-7739; ETN-87-98853) Avail: NTIS HC A08/MF A01; DFVLR, Cologne, West Germany DM 46

Remote sensing; 90 GHz satellite-borne radiometer experiment; monocular electro-optical stereo scanner; automatic payload control; ISRO telemetry and tracking and command network and computer networking were discussed. For individual titles, see N87-15241 through N87-15252.

N87-15241# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
STATUS OF ISRO/DFVLR COOPERATION
H. Oettl and Y. S. Rajan (Indian Space Research Organization, Bangalore) *In its* Colloquium about Joint Projects within the DFVLR/ISRO Cooperation Jul. 1986 p 15-20 (For primary document see N87-15240 07-12)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne, West Germany DM 46

West German and Indian space programs covering automatic payload control, spread-F experiments, electro-optical stereo scanning, a 90 GHz satellite-borne radiometer, computer networking, and materials and structures are summarized. ESA

N87-15242# Indian Space Research Organization, Ahmedabad. Space Application Centre.
INDIAN REMOTE SENSING PROGRAM
P. D. Bhavsar *In* DFVLR Colloquium about Joint Projects within the DFVLR/ISRO Cooperation Jul. 1986 p 21-27 (For primary document see N87-15240 07-12)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne, West Germany DM 46

The history of Indian remote sensing research is outlined. Participation in LANDSAT and NOAA is summarized. The design and production of sensors and the Bhaskara satellites are described. Satellite utilization in agriculture, geology, and Earth resources is outlined. International remote sensing projects are mentioned. ESA

N87-15243# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
SABREX: A 90 GHz RADIOMETER EXPERIMENT ON A ROHINI SATELLITE c19
W. Keydel *In its* Colloquium about Joint Projects within the DFVLR/ISRO Cooperation Jul. 1986 p 29-56 Original contains color illustrations (For primary document see N87-15240 07-12)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne, West Germany DM 46

A 90 GHz microwave radiometer to be flown on an Indian Rohini satellite together with an optical sensor containing channels at 650 nm and 850 nm is described. The goal of the 90 GHz microwave experiment is the experimental verification of space-borne 90 GHz radiometry capabilities, in view of payloads for shuttle, satellites, and space stations. ESA

N87-15244# Indian Space Research Organization, Bangalore. Satellite Center.
STATUS OF LAUNCH VEHICLE, SATELLITE AND MISSION

RELATED ACTIVITIES FOR MEOSS c18
T. Singh *In* DFVLR Colloquium about Joint Projects within the DFVLR/ISRO Cooperation Jul. 1986 p 57-72 (For primary document see N87-15240 07-12)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne, West Germany DM 46

The mission status of the ground segment, launch vehicle, satellite and communication facilities of the Mono Electro-Optical Stereo Scanner (MEOSS) project is summarized. The MEOSS will be launched by an improved version of the SLV-3, capable of deploying a 300 kg satellite in 400 km orbit. The satellite is one of the Stretched Rohini series, three-axis stabilized. ESA

N87-15245# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
PRESENTATION OF THE STATUS OF THE EXPERIMENT MONOCULAR ELECTRO-OPTICAL STEREO SCANNER (MEOSS) c43
F. Lanzl *In its* Colloquium about Joint Projects within the DFVLR/ISRO Cooperation Jul. 1986 p 73-81 (For primary document see N87-15240 07-12)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne, West Germany DM 46

The mission parameters, payload specifications, instrument design, and scientific goals of the Mono Electro-Optical Stereo Scanner (MEOSS) are summarized. The MEOSS will be launched by an Indian launch vehicle into a 450 km orbit. It is a linear CCD array, covering the 570 to 700 nm spectral range, with 256 km swath width. Stereo base is 2 x 198 km; ground resolution is 52 and 79 m along and across track respectively. Height resolution is 55 m. ESA

N87-15246# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
A FLIGHT DEMONSTRATION PROGRAM ON SPACE DATA HANDLING c82
J. Beck *In its* Colloquium about Joint Projects within the DFVLR/ISRO Cooperation Jul. 1986 p 83-92 (For primary document see N87-15240 07-12)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne, West Germany DM 46

Onboard data processing in the Autonomous Payload Control (APC) program is reviewed. The Space Station Information System and the Columbus Information Management System show full accordance with respect to end-to-end data transportation as proposed much earlier to the APC missions. Therefore, the APC demonstration program will be a very effective and low-cost experimental flight test bed to gather experience with advanced data transportation procedures. But the mission can keep its importance only if it remains undelayed within the present time frame, with launch target in 1988 and a following operational flight period of 1 yr minimum. ESA

N87-15247# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
APC: A CONCEPT DEMONSTRATION OF END-TO-END PACKETIZED DATA TRANSPORTATION TECHNIQUES c32
W. Markwitz and G. Mayer *In its* Colloquium about Joint Projects within the DFVLR/ISRO Cooperation Jul. 1986 p 93-103 (For primary document see N87-15240 07-12)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne, West Germany DM 46

Function and status of the Autonomous Payload Control (APC) Flight Demonstration projects are reviewed. The APC rocket experiment, the technology driver for a future autonomous payload is at protosystems readiness, whereas the satellite experiment (APC-SATEX) was split in two parts due to the restrictions imposed by the satellite. Details on the SATEX-1 payload at the end of the phase-A studies are summarized. The projects study packet telemetry, onboard trajectory determination, multisensor based attitude filtering and calculation of Euler angles, attitude cross-check by a CCD coastline sensor, and near real time ground data distribution by an X.25 compatible network by telephone at 1.2 kbs. ESA

N87-15248# Essen Univ. (West Germany).
SPACE APPLICATIONS OF BASIC PLASMA THEORY c75
K. H. Spatchek *In* DFVLR Colloquium about Joint Projects within the DFVLR/ISRO Cooperation Jul. 1986 p 105-112 Sponsored by DFVLR and Indian Space Research Organization (For primary document see N87-15240 07-12)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne, West Germany DM 46

Research on nonlinear plasma phenomena is summarized. Generation of electromagnetic waves; propagation of nonlinear waves; anomalous transport; and wave number and frequency spectra are discussed. ESA

N87-15249# Indian Space Research Organization, Sriharikota.
ISRO TELEMETRY, TRACKING AND COMMAND NETWORK (ISTRA) c17
N. Pant *In* DFVLR Colloquium about Joint Projects within the DFVLR/ISRO Cooperation Jul. 1986 p 113-120 (For primary document see N87-15240 07-12)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne, West Germany DM 46

The ISRO telemetry, tracking, and command network supports satellite and launch vehicle missions of ISRO. For ISRO satellite missions, it is used for tracking, command, and housekeeping data acquisition throughout mission life. For ISRO launch vehicle missions such as ASLV and PSLV, it provides telemetry data acquisition support from lift-off to satellite injection, as well as down range tracking support for monitoring and determining orbit injection. ESA

N87-15250# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany).
COMPUTER NETWORKING c62
G. Fischer *In its* Colloquium about Joint Projects within the DFVLR/ISRO Cooperation Jul. 1986 p 121-130 (For primary document see N87-15240 07-12)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne, West Germany DM 46

The computer networks developed to support DFVLR's aerospace research are described. ESA

N87-15251# Indian Space Research Organization, Ahmedabad. Space Applications Center.
SATELLITE COMMUNICATIONS c32
E. V. Chitnis *In* DFVLR Colloquium about Joint Projects with the DFVLR/ISRO Cooperation Jul. 1986 p 137-142 (For primary document see N87-15240 07-12)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne, West Germany DM 46

Indian space programs concerning the use of satellite networks for education, television, communications, meteorology, and wave propagation experiments are listed. ESA

N87-15252# Indian Space Research Organization, Trivandrum.
POSSIBLE AREAS OF COLLABORATION BETWEEN DFVLR AND ISRO IN THE FIELDS OF STRUCTURES AND MATERIALS c84
V. Gowariker *In* DFVLR Colloquium about Joint Projects within the DFVLR/ISRO Cooperation Jul. 1986 p 143-148 (For primary document see N87-15240 07-12)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne, West Germany DM 46

Research possibilities in large space structures and microgravity experiments on composites and polymers are outlined. ESA

N87-15353*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
GIOTTO MISSION SUPPORT
C. Stelzried and T. Howe *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 243-248 (For primary

document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 22A

N87-15354*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
GIOTTO NAVIGATION SUPPORT
N. A. Mottinger and R. I. Premkumar *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 249-262 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 22A

N87-15355*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PATHFINDER OPERATIONS
J. Wilcher, C. Stelzried, and S. Finley *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 263-267 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 22A

N87-15356*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
VEGA PATHFINDER NAVIGATION FOR GIOTTO HALLEY ENCOUNTER
J. Ellis and T. P. McElrath *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 268-278 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 22A

N87-15358*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ICE SECOND HALLEY RADIAL: TDA MISSION SUPPORT AND DSN OPERATIONS
N. A. Fanelli, L. Efron, and R. J. Muellerschoen *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 285-290 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 22A

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbital and launching dynamics.

No abstracts in this category.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research and Support Facilities (Air).*

N87-15253*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
WEIGHTLESSNESS SIMULATION SYSTEM AND PROCESS Patent Application
Hubert C. Vykukal, inventor (to NASA) Filed 29 Oct. 1986 14 p Sponsored by NASA
(NASA-Case-ARC-11646-1; NAS 1.71:ARC-11646-1; US-Patent-Appl-SN-924398) Avail: NTIS HC A02/MF A01 CSCL 14B

A weightlessness simulator has a chamber and a suit in the chamber. O-rings and valves hermetically seal the chamber. A vacuum pump connected to the chamber establishes a pressure in the chamber less than atmospheric pressure. A water supply tank and water supply line supply a body of water to the chamber as a result of partial vacuum created in the chamber. In use, an astronaut enters the pressure suit through a port, which remains open to ambient atmosphere, thus supplying air to the astronaut during use. The pressure less than atmospheric pressure in the chamber is chosen so that the pressure differential from the inside to the outside of the suit corresponds to the pressure differential with the suit in outer space. NASA

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; operating problems of launch/space vehicle systems; and reusable vehicles.

For related information see also *20 Spacecraft Propulsion and Power.*

N87-15254# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE SECRET OF GUIDED MISSILE RE-ENTRY
Jingzhong Chen and Sehua An 25 Jun. 1986 16 p Transl. into ENGLISH from Kexue Shiyan (China), no. 11, 1985 p 20-25
(AD-A169598; FTD-ID(RS)T-0459-86) Avail: NTIS HC A02/MF A01 CSCL 16/3

The history and development of reentry vehicles especially as related to guided missiles is studied. The development of fiber reinforced composites to avoid the combustion of reentry vehicle heads is described. The ionization of molecules caused by high temperature friction with the air during high speed reeentry is briefly described. Reentry remote sensing as an important basis for developing configuration and predicting accuracy of point of impact of the guided missile is also discussed. E.R.

N87-15255# Ballistic Research Labs., Aberdeen Proving Ground, Md.
ASSESSMENT OF TWO FAST CODES USED FOR PRELIMINARY AERODYNAMIC DESIGN OF GUIDED PROJECTILES Final Technical Report
Ameer G. Mikhail Jul. 1986 47 p
(AD-A171276; BRL-TR-2747) Avail: NTIS HC A03/MF A01 CSCL 19/1

Two missile aerodynamic prediction fast codes, namely NSWCAP and Missile-DATCOM, have been applied to the geometry of the guided, gun-launched Copperhead projectile. Assessment of the two codes was made in comparison with wind tunnel and free-flight range test data. Two configurations were considered for computation: the launch configuration (body-tail) in the Mach range of 0.5 to 1.8 and the maneuvering configuration (body-wing-tail) in the Mach range of 0.3 to 0.95. Results show reasonable agreement for the drag coefficient, C sub D, and show very large disagreements for both C sub N sub alpha and C sub M sub alpha. The incapability of both codes to include body slots and fin gap effects seems to have contributed largely to these differences. The dynamic derivatives C sub l sub p and (C sub M sub q + C sub M sub alpha) are not adequately estimated by the NSWCAP code, and are not calculated in the DATCOM code. For the coefficients actually computed, the DATCOM code results were slightly more accurate than those of the NSWCAP code. Both codes lack the determination of the explicit effects of control surface deflection angles on the aerodynamic coefficients. Development is needed for the determination if both codes are to be used for predictions for guided projectiles. Several areas of improvements in both codes are identified. Author (GRA)

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and space rescue techniques.

For related information see also *03 Air Transportation and Safety* and *18 Spacecraft Design, Testing and Performance.* For space suits see *54 Man/System Technology and Life Support.*

N87-15256# Committee on Science and Technology (U. S. House).
INVESTIGATION OF THE CHALLENGER ACCIDENT, VOLUME 1
Washington GPO 1986 778 p Hearings before the Committee on Science and Technology, 99th Congress, 2nd Session, No. 137, 10-12, 17, 18 and 25 Jun. 1986
(GPO-64-295) Avail: Committee on Science and Technology

The causes and the ramifications of the explosion of the space shuttle Challenger and the loss of her crew are discussed. First the technology and the hardware which caused the accident will be examined. Second, the management problems and decision making problems within NASA will be discussed. The last focus will deal with the future of the space program, and the question, where do we go from here? B.G.

N87-15257# Air Force Geophysics Lab., Hanscom AFB, Mass.
SHUTTLE CONTAMINATION MODELING: EVOLUTION OF IONIZED SHUTTLE EXHAUST, ENVIRONMENTAL RESEARCH PAPERS
Michael Heinemann 22 Jan. 1986 32 p
(AD-A172276; AFGL-TR-86-0023; AFGL-ERP-945) Avail: NTIS HC A03/MF A01 CSCL 04/1

We consider the evolution of ionized Shuttle exhaust. While the source of ionization is not treated, the subsequent evolution can be understood in a certain amount of detail. The fundamental conclusion are that: (1) Low-density ions expand with neutral exhaust for about 100 m where they go through a rapid transition to collisionless behavior and then are swept away (in the Shuttle frame of reference) by the magnetic field, and radially away from the Shuttle: neither the ambient ionosphere nor the geomagnetic field can significantly change this behavior. The details of the evolution can be affected by low-level (approx. 0.1 mV/m) parallel electric fields. The mirror force associated with the geomagnetic field is too weak to have any effect. GRA

17 SPACE COMM., SPACECRAFT COMM., COMMAND & TRACKING

Includes telemetry; space communications networks; astronavigation and guidance; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications and Radar.*

N87-15249# Indian Space Research Organization, Sriharikota.
ISRO TELEMETRY, TRACKING AND COMMAND NETWORK (ISTRA)
N. Pant *In* DFVLR Colloquium about Joint Projects within the DFVLR/ISRO Cooperation Jul. 1986 p 113-120 (For primary document see N87-15240 07-12)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne, West Germany DM 46

N87-15337*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
RELATIVE PERFORMANCE OF 8.5-GHz AND 32-GHz TELEMETRY LINKS ON THE BASIS OF TOTAL DATA RETURN PER PASS
M. A. Koerner *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 65-80 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 09F

N87-15348*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SOFTWARE DEVELOPMENT FOR THE VLA-GDSCC TELEMETRY ARRAY PROJECT
H. W. Cooper and L. R. Hileman *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 174-178 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 09F

N87-15349*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
REAL-TIME COMBINER LOSS
M. K. Simon and A. Mileant *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 179-184 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 09F

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes satellites; space platforms; space stations; spacecraft systems and components such as thermal and environmental controls; and attitude controls.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance, 39 Structural Mechanics,* and *16 Space Transportation.*

N87-15258 Ohio State Univ., Columbus.
PERTURBATION SOLUTIONS OF THE EQUATIONS OF MOTION FOR A CLASS OF DUAL-SPIN SPACECRAFT Ph.D. Thesis
James Ross Beaty 1986 169 p
Avail: Univ. Microfilms Order No. DA8618742

The rotational dynamics of a class of dual-spin spacecraft are examined and solutions of the equations of motion are developed using the generalized method of averaging algorithm. In this context, the dual-spin spacecraft consists of a balanced, but slightly asymmetric rotor and a slightly unbalanced and slightly asymmetric platform. The two bodies are treated as rigid, and are constrained so that there is a single degree of freedom of relative motion between the two, namely, spin about the axis of the shaft connecting them. A despin motor is mounted on this shaft and is used to apply a torque which is intended to despin the platform until a state of zero rotational motion of the platform is achieved. A comprehensive set of equations of motion are derived with the components of the system angular momentum and the platform spin axis angular momentum. These equations are then transformed into a form suitable for the application of the Generalized Method of Averaging algorithm by using Euler angles which orient the spacecraft axes with respect to an inertial frame of reference and by eliminating terms higher than first-order in the equations. Explicit solutions of the averaged equations are presented, along with numerical comparisons with the exact solution which is obtained by numerical integration of the equations of motion. The numerical integration of the equations of motion highlights a significant error reported in the literature, which is also discussed.
Dissert. Abstr.

N87-15259*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SPACE SPIDER CRANE Patent Application
Ian O. MacConochie, inventor (to NASA), Jack E. Pennington, inventor (to NASA), Charles F. Bryan, Jr., inventor (to NASA), Martin M. Mikulas, Jr., inventor (to NASA), and Rebecca L. Kinkead, inventor (to NASA) Filed 30 Sep. 1986 18 p
(NASA-Case-LAR-13411-1; NAS 1.71:LAR-13411-1; US-Patent-Appl-SN-913432) Avail: NTIS HC A02/MF A01 CSCL 84G

A space spider crane for the movement, placement, and/or assembly of various components on or in the vicinity of a space structure is described. As permanent space structures are utilized

by the space program, a means will be required to transport cargo and perform various repair tasks. A space spider crane comprising a small central body with attached manipulators and legs fulfills this requirement. The manipulators may be equipped with constant pressure gripping end effectors or tools to accomplish various repair tasks. The legs are also equipped with constant pressure gripping end effectors to grip the space structure. Control of the space spider crane may be achieved either by computer software or a remotely situated human operator, who maintains visual contact via television cameras mounted on the space spider crane. One possible walking program consists of a parallel motion walking program whereby the small central body alternatively leans forward and backward relative to end effectors. NASA

N87-15260*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
MOBILE REMOTE MANIPULATOR SYSTEM FOR A TETRAHEDRAL TRUSS Patent Application
Clarence J. Wesselski, inventor (to NASA) and William C. Schneider, inventor (to NASA) Filed 5 Sep. 1986 25 p
(NASA-Case-MSC-20985-1; NAS 1.71:MSC-20985-1; US-Patent-Appl-SN-904134) Avail: NTIS HC A02/MF A01 CSCL 22B

The mobile remote manipulator system (MRMS) was initially developed for transit about the trusses of the delta space station; however, it can be utilized just as easily for transit about the trusses of the dual keel station. The MRMS is comprised of a mobile platform B having a rail system formed of transversely disposed T-shaped tracks, which engage with guide pins located at the nodes of the trusses. The guide pins form a grid and the tracks are so designed as to permit travel in either of two orthogonal directions. For travel the MRMS is provided with retractable, reversible chain drive systems, which selectively engage sprockets on the guide pins for either longitudinal or transverse travel. The MRMS is also provided with direction changing means at the intersection of the track systems to change from longitudinal to transverse travel. The MRMS provides a near-uniform traversing velocity with minimal dynamic loading on the system. NASA

N87-15261*# National Aeronautics and Space Administration, Washington, D.C.
X-RAY SATELLITE (ROSAT) Status Report, 1st quarter 1986
Aug. 1986 43 p Transl. into ENGLISH of "Roentgen Satellit Statusbericht 1. Quartal 1986" DFVLR, West Germany, 5 May 1986 p 1-60 Transl. by The Corporate Word, Inc., Pittsburg, Pa.
(Contract NASw-4006)
(NASA-TM-88499; NAS 1.15:88499) Avail: NTIS HC A03/MF A01 CSCL 22B

With regards to technical performance, the project is running according to plan. An increase in total cost outlay was required. The new Dornier Systems schedule projects ROSAT launch readiness for April 27, 1988. However, as a result of the Challenger accident, no binding launch date has been received from NASA. The thirteenth status review was conducted at the prime contractor in March, 1986. Assembly of the FM mirror system has been interrupted due to irregularities in the gold damping; in addition, mission operation and simulator development are effected by understaffing. Postponements have been announced in the data transmission and components acquisition subsystems. Author

N87-15262*# Martin Marietta Aerospace, Denver, Colo.
DYNAMIC TESTING OF A TWO-DIMENSIONAL BOX TRUSS BEAM Final Report
Charles W. White Washington NASA Jan. 1987 64 p
(Contract NAS1-17551)
(NASA-CR-4039; NAS 1.26:4039; MCR-86-575) Avail: NTIS HC A04/MF A01 CSCL 22B

Testing to determine the effects of joint freeplay and pretensioning of diagonal members on the dynamic characteristics of a two-dimensional box truss beam was conducted. The test article was ten bays of planar truss suspended by long wires at each joint. Each bay measured 2 meters per side. Pins of varying size were used to simulate various joint freeplay conditions. Single-point random excitation was the primary method of test. The rational fraction polynomial method was used to extract modal characteristics from test data. A finite element model of the test article was generated from which modal characteristics were predicted. These were compared with those obtained from tests. With the exception of the fundamental mode, correlation of theoretical and experimental results was poor, caused by the resonant coupling of local truss member bending modes with global truss beam modes. This coupling introduced many modes in the frequency range of interest whose frequencies were sensitive to joint boundary conditions. It was concluded that local/global coupling must be avoided in the frequency range where accurate modal characteristics are required. Author

N87-15263# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
OPTIMIZATION OF CLOSED LOOP EIGENVALUES: MANEUVERING, VIBRATION CONTROL AND STRUCTURE/CONTROL DESIGN ITERATION FOR FLEXIBLE SPACECRAFT Final Report, Jun. 1985 - May 1986
John L. Junkins 31 May 1986 151 p Prepared in cooperation with Texas A and M Univ., College Station
(Contract F49620-83-K-0032)
(AD-A172716; AFOSR-86-0905TR) Avail: NTIS HC A08/MF A01 CSCL 22/2

This report summarizes new results on spacecraft dynamics and control. Perturbation methods are presented for computing nonlinear open and closed loop optimal maneuver control. Homotopy optimization algorithms are presented for tuning linear regulators vis-a-vis eigenvalue placement and robustness. A simultaneous structure/controller design optimization algorithm is developed. GRA

N87-15264# Texas A&M Univ., College Station. Mechanics and Materials Center.
A MODEL FOR PREDICTING THERMOMECHANICAL RESPONSE OF LARGE SPACE STRUCTURES Final Technical Report, Apr. 1983 - May 1986
D. H. Allen and W. E. Haisler Jul. 1986 286 p
(Contract F49620-83-C-0067)
(AD-A172966; MM-4875-86-16; AFOSR-86-0884TR) Avail: NTIS HC A13/MF A01 CSCL 13/13

A report on predictions of the thermomechanical response of large space structures contains the following: Summary of Completed Research, Literature Survey, Selection of Constitutive Equations, Coupled Energy Balance Law, Space Structural Response Algorithms, Model Results for Large Space Structures; Publications List; A Prediction of Heat Generation in a Thermoviscoplastic Uniaxial Bar, An Efficient and Accurate Alternative to Subincrementation for Elastic Plastic Analysis by the Finite Element Method, Predicted Axial Temperature Gradient in A Viscoplastic Uniaxial Bar Due to Thermomechanical Coupling, Predicted Temperature Field in a Thermomechanically Heated Viscoplastic Space Truss Structure, Effect of Degradation of Material Properties on the Dynamic Response of Large Space Structures, A Fractographic Study of Damage Mechanisms in Short-Fiber Metal Matrix Composites, Analytical and Numerical Solution of a Time Dependent Thermoviscoplastic Problem in Mechanics, A Finite Element Model for the Thermoelastic Analysis of Large Composite Space Structures, and Predicted Dynamic Response of a Composite Beam with Load History Dependent and Spatially Variable Damage. GRA

N87-15244# Indian Space Research Organization, Bangalore. Satellite Center.
STATUS OF LAUNCH VEHICLE, SATELLITE AND MISSION RELATED ACTIVITIES FOR MEOSS
T. Singh *In* DFVLR Colloquium about Joint Projects within the DFVLR/ISRO Cooperation Jul. 1986 p 57-72 (For primary document see N87-15240 07-12)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne, West Germany DM 46

N87-15389# Science Research Council, Chilton (England). Rutherford Appleton Lab.
LAND MOBILE SATELLITE SYSTEMS USING HIGHLY ECCENTRIC ORBITS
J. R. Nordbury *In* ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 131-136 (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

N87-15265# Air Force Geophysics Lab., Hanscom AFB, Mass.
QUADRUPOLE ION/NEUTRAL MASS SPECTROMETER FOR SPACE SHUTTLE APPLICATIONS: ENVIRONMENTAL RESEARCH PAPERS
Donald E. Hunton, Edmund Trzcinski, Lois Wlodyka, Gennaro Federico, and John Dorian 7 Apr. 1986 71 p
(AD-A172275; AFGL-TR-86-0084; AFGL-ERP-953) Avail: NTIS HC A04/MF A01 CSCL 14/2

A Quadrupole Ion/Neutral Mass Spectrometer (QINMS) was developed for the fourth flight of the Space Shuttle in June and July of 1982. Several additional instruments have been built for other programs using the same design. The instruments are designed to measure the neutral and positive ion composition in the vicinity of the Space Shuttle or similar satellites. Other experimental capabilities include the measurements of total neutral pressure, total ion density, and species kinetic energy distributions. This report describes in detail the design and construction of the QINMS instruments, the integration requirements, ground testing and calibration procedures, typical flight operations, and finally, data requirements. GRA

N87-15243# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
SABREX: A 90 GHz RADIOMETER EXPERIMENT ON A ROHINI SATELLITE
W. Keydel *In its* Colloquium about Joint Projects within the DFVLR/ISRO Cooperation Jul. 1986 p 29-56 Original contains color illustrations (For primary document see N87-15240 07-12)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne, West Germany DM 46

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels, 44 Energy Production and Conversion,* and *15 Launch Vehicles and Space Vehicles.*

N87-15266 Alabama Univ., Huntsville.
INTERACTIONS OF COUPLED ACOUSTIC AND VORTICAL INSTABILITIES IN ROCKET COMBUSTION CHAMBERS Ph.D. Thesis
Jeong Lak Sohn 1986 169 p
Avail: Univ. Microfilms Order No. DA8619065

Unstable waves may occur as a result of acoustic and/or vortical (hydrodynamic) oscillations. If these two different types of waves are coupled together, their physical interactions lead to extremely complicated phenomena. Theoretically, an infinite number of frequencies for both acoustic and vortical oscillations exist. Realistically, only a limited number of combined nature are excited. The objective is then, to determine the combined nature of acoustic and vortical frequencies at which instabilities may arise. This is important in rocket motor chambers when the vortical field is coupled with acoustic pressure oscillations. In the past, the acoustic combustion instability was studied independently of the vortical instability induced by vortex motions. This paper is intended to combine the two different sources of energy everywhere within the spatial domain and to determine the effect of one upon the other. This can be achieved by calculating the mean flow velocities and vorticities and their fluctuating parts of velocities and vortices, as well as the fluctuating pressure. To elucidate this coupling mechanism, however, a very simple model is first introduced. The Orr-Sommerfeld equation is utilized to determine the wave numbers and the unsteady stream functions from which vortically coupled acoustic instability growth constants are calculated. This process demonstrates that there are two different frequencies, acoustic and vortical, various combinations of which contribute to either damping or amplification. Dissert. Abstr.

N87-15267*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ELECTRICAL POWER SYSTEM DESIGN FOR THE US SPACE STATION
Donald L. Nored and Daniel T. Bernatowicz 29 Aug. 1986 19 p Presented at the 21st Intersociety Energy Conversion Engineering Conference, San Diego, Calif., 25-29 Aug. 1986; cosponsored by ACS, SAE, ANS, ASME, IEEE, AIAA and AIChE
(NASA-TM-88824; E-3073; NAS 1.15:88824) Avail: NTIS HC A02/MF A01 CSCL 22B

The multipurpose, manned, permanent space station will be our next step toward utilization of space. A multikilowatt electrical power system will be critical to its success. The power systems for the space station manned core and platforms that have been selected in definition studies are described. The system selected for the platforms uses silicon arrays and Ni-H2 batteries. The power system for the manned core is a hybrid employing arrays and batteries identical to those on the platform along with solar dynamic modules using either Brayton or organic Rankine engines. The power system requirements, candidate technologies, and configurations that were considered, and the basis for selection, are discussed. Author

N87-15268*# Battelle Columbus Labs., Ohio. SSME Study Group.
STUDIES AND ANALYSES OF THE SPACE SHUTTLE MAIN ENGINE: SSME FAILURE DATA REVIEW, DIAGNOSTIC SURVEY AND SSME DIAGNOSTIC EVALUATION
R. C. Glover, B. A. Kelley, and A. E. Tischer 15 Dec. 1986 348 p
(Contract NASw-3737)
(NASA-CR-178993; NAS 1.26:178993; BCD-SSME-TR-86-1) Avail: NTIS HC A15/MF A01 CSCL 21H

The results of a review of the Space Shuttle Main Engine (SSME) failure data for the period 1980 through 1983 are presented. The data was collected, evaluated, and ranked according to procedures established during this study. A number of conclusions and recommendations are made based upon this failure data review. The results of a state-of-the-art diagnostic survey are also presented. This survey covered a broad range of diagnostic sensors and techniques and the findings were evaluated for application to the SSME. Finally, a discussion of the initial activities for the on-going SSME diagnostic evaluation is included. Author

N87-15269*# Pratt and Whitney Aircraft, West Palm Beach, Fla. Government Products Div.
BREADBOARD RL10-11B LOW THRUST OPERATING MODE Final Test Report, 24-29 Feb. 1984
Thomas D. Kmiec and Donald E. Galler Jan. 1987 83 p
(Contracts NAS3-24238; NAS3-22902)
(NASA-CR-174914; NAS 1.26:174914; FR-18683-2) Avail: NTIS HC A05/MF A01 CSCL 21H

Cryogenic space engines require a cooling process to condition engine hardware to operating temperature before start. This can be accomplished most efficiently by burning propellants that would otherwise be dumped overboard after cooling the engine. The

resultant low thrust operating modes are called Tank Head Idle and Pumped Idle. During February 1984, Pratt & Whitney conducted a series of tests demonstrating operation of the RL10 rocket engines at low thrust levels using a previously untried hydrogen/oxygen heat exchanger. The initial testing of the RL10-11B Breadboard Low Thrust Engine is described. The testing demonstrated operation at both tank head idle and pumped idle modes. Author

N87-15270*# Ford Aerospace and Communications Corp., Palo Alto, Calif.
SPACE STATION EXPERIMENT DEFINITION: ADVANCED POWER SYSTEM TEST BED Final Report
H. E. Pollard and R. E. Neff 15 Dec. 1986 148 p
(Contract NAS3-24664)
(NASA-CR-179502; NAS 1.26:179502; WDL-TR10939) Avail: NTIS HC A07/MF A01 CSCL 10B

A conceptual design for an advanced photovoltaic power system test bed was provided and the requirements for advanced photovoltaic power system experiments better defined. Results of this study will be used in the design efforts conducted in phase B and phase C/D of the space station program so that the test bed capabilities will be responsive to user needs. Critical PV and energy storage technologies were identified and inputs were received from the idustry (government and commercial, U.S. and international) which identified experimental requirements. These inputs were used to develop a number of different conceptual designs. Pros and cons of each were discussed and a strawman candidate identified. A preliminary evolutionary plan, which included necessary precursor activities, was established and cost estimates presented which would allow for a successful implementation to the space station in the 1994 time frame. Author

N87-15271*# California Polytechnic State Univ., San Luis Obispo. Dept. of Mechanical Engineering.
THERMAL ANALYSIS AND DESIGN OF A COOLING SYSTEM FOR A MACH 14 NOZZLE Final Report, Feb. 1986 - Jan. 1987
Ronald Mullisen and Keith Kaste 30 Jan. 1987 99 p
(Grant NAG2-389)
(NASA-CR-180098; NAS 1.26:180098) Avail: NTIS HC A05/MF A01 CSCL 21H

The analysis and design of a Mach 14 converging diverging nozzle wall liner is provided. The analysis indicates that: no fin on the coolant side of the nozzle wall is optimum, the thermal stresses are dominant, and the critical area is very near the throat. The molybdenum alloy TZM, with a wall thickness of 2.0 mm in the throat area, appears to be the only material capable of meeting design requirements. Additionally, cooling water at 2000 psia with a flow velocity of 25 m/s in the coolant passages is required. Author

N87-15272*# Pratt and Whitney Aircraft, West Palm Beach, Fla. Government Products Div.
LOW HEAT TRANSFER OXIDIZER HEAT EXCHANGER DESIGN AND ANALYSIS Topical Report, Oct. 1985 - Oct. 1986
P. G. Kanic, T. D. Kmiec, and R. J. Peckham 30 Jan. 1987 51 p
(Contract NAS3-24238)
(NASA-CR-179488; NAS 1.26:179488; FR-19135-2) Avail: NTIS HC A04/MF A01 CSCL 21H

The RL10-IIB engine, a derivative of the RLIO, is capable of multi-mode thrust operation. This engine operates at two low thrust levels: tank head idle (THI), which is approximately 1 to 2 percent of full thrust, and pumped idle (PI), which is 10 percent of full thrust. Operation at THI provides vehicle propellant settling thrust and efficient engine thermal conditioning; PI operation provides vehicle tank pre-pressurization and maneuver thrust for log-g deployment. Stable combustion of the RL10-IIB engine at THI and PI thrust levels can be accomplished by providing gaseous oxygen at the propellant injector. Using gaseous hydrogen from the thrust chamber jacket as an energy source, a heat exchanger can be used to vaporize liquid oxygen without creating flow instability. This report summarizes the design and analysis of a United Aircraft Products (UAP) low-rate heat transfer heat exchanger concept for the RL10-IIB rocket engine. The design represents a second iteration of the RL10-IIB heat exchanger investigation program. The design and analysis of the first heat exchanger effort is presented in more detail in NASA CR-174857. Testing of the previous design is detailed in NASA CR-179487. Author

N87-15273# Department of the Air Force, Washington, D.C.
METHOD AND APPARATUS FOR INCREASING SERVICE LIFE OF AUGMENTOR AND COMBUSTION CHAMBER LINERS Patent Application
Raymond J. Bruchez, inventor (to Air Force) Filed 4 Jun. 1986 16 p
(AD-D012443; US-Patent-Appl-SN-870552) Avail: NTIS HC A02/MF A01 CSCL 21/5

This patent application discloses a heat shield assembly for attachment to an afterburner liner. The heat shield assembly comprises a clamp and an optional support bracket which hold a carbon-carbon panel adjacent to the liner. The carbon-carbon panel shields a damaged area of the liner in order to extend liner's service life. GRA

N87-15274# Ogden Air Logistics Center, Hill AFB, Utah. Propellant Analysis Lab.
SURVEILLANCE REPORT. STAGE 1: DISSECTED MOTOR/PROPELLANT MOTOR NUMBER 0012029 Annual Report
John A. Thompson Feb. 1986 226 p
(AD-A171132; MAQCP-515(86)) Avail: NTIS HC A11/MF A01 CSCL 21/8

Testing was performed on First Stage Minuteman TP-H1011 propellant and case bond specimens from the dome end of motor S/N 0012029. This testing was performed to assure that deteriorations in motor physical and thermal properties could be detected in time to take corrective action before the system performance deteriorated beiow an acceptable level. From the analysis of the test results, the propellant and case bond properties have not deteriorated below an acceptable level at the present time and for two years beyond the oldest data point. GRA

23 CHEMISTRY AND MATERIALS (GENERAL)

N87-15275*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PREPARATION OF B-TRICHLOROBORAZINE Patent Application
Salvatore R. Riccitiello, inventor (to NASA), Ming-Ta S. Hsu, inventor (to NASA), and Timothy S. Chen, inventor (to NASA) Filed 28 Aug. 1986 11 p Sponsored by NASA
(NASA-Case-ARC-11643-1-SB; NAS 1.71:ARC-11643-1-SB; US-Patent-Appl-SN-901496) Avail: NTIS HC A02/MF A01 CSCL 07A

A method of preparing B-trichloroborazine is disclosed. Generally, the method includes the combination of gaseous boron trichloride and excess gaseous ammonia at ambient temperature or below, under anhydrous conditions in a polar organic solvent, heating the reaction mixture to 100 to 140 C for a time effective to produce the trichloroborazine, cooling and removing the ammonium chloride formed, removing the solvent at ambient pressure, and recovering the B-trichloroborazine. A preferred solvent in the process is anhydrous toluene. Yields of B-trichloroborazine of about 40 percent are obtained. This process provides both a laboratory and larger-scale preparation from gaseous components. B-trichloroborazine is useful in a number of chemical reactions including the formation of high temperature inorganic polymers. NASA

24 COMPOSITE MATERIALS

Includes physical, chemical, and mechanical properties of laminates and other composite materials.
For ceramic materials see *27 Nonmetallic Materials.*

N87-15276 Washington Univ., Seattle.
FINITE ELEMENT ANALYSIS OF PROPAGATING INTERFACE CRACKS IN COMPOSITES Ph.D. Thesis
Mohammad Ali Aminpour 1986 280 p
Avail: Univ. Microfilms Order No. DA8613131

A complex variable formulation has been developed to describe the near-field state of stresses and displacements for a propagating crack along the interface of two dissimilar anisotropic materials. It is shown that the formulation is general and can be reduced to all the other subordinate cases. The crack can be propagating or stationary and each of the materials on the sides of the crack can be anisotropic, orthotropic or isotropic. The near-field stresses contain the regular square root singularity and the oscillatory behavior in case of dissimilar materials on the sides of the crack. A new definition for the stress intensity factors is proposed. It is proportional to the coefficient of the lowest order term of the nearfield state of stresses and reduces to all the subordinate cases to within a multiplicative factor. A detailed description of the development of the near-field state of stresses and displacements is presented. A finite element procedure utilizes a singular element which gives the direct solution of the time-dependent stress intensity factors. The procedure for the finite element formulation including a detailed description of the development of the singular element is presented. The element matrices are derived from a variational principle involving a modified functional for elastodynamic problems. Dissert. Abstr.

N87-15277*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
COMPARISON OF FLEXURAL PROPERTIES OF ARAMID-REINFORCED PULTRUSIONS HAVING VARIED MATRICES, PRETREATMENTS AND POSTCURES
Maywood L. Wilson, Gary S. Johnson, and Ian O. MacConochie Jan. 1987 11 p Presented at the 41st Annual Conference of the Society of the Plastics Industry, Reinforced Plastics/Composites Institute, Atlanta, Ga., 27-31 Jan. 1986 Submitted for publication (NASA-TM-88997; L-16152; NAS 1.15:88997) Avail: NTIS HC A02/MF A01 CSCL 11D

Aramid-reinforced composite materials of equal fiber volume and varied polymer thermoset matrices were pultruded and flexurally tested to failure. The objective was to improve the flexural properties of aramid-reinforced pultrusions. Pultrusions of both sized and unsized aramid fiber with four different resin systems were compared to determine the effects of sizing compounds and postcuring on flexural strength, fiber wettability, and fiber-to-resin interface bonding. Improvements in flexural strength resulting from pretreatments with the sizing solutions used were marginal. The most significant improvements in flexural properties resulted from postcuring. Flexural strengths ranged from a low of 39,647 psi (273MPa) to a high of 80,390 psi (554 MPa), an overall increase of 103 percent. The fact that postcuring improved the flexural properties of the pultrusions of the four resin systems indicates that a full cure did not occur in any of the resin systems during the pultrusion process. The increased flexural strengths of the polyester and vinyl ester pultrusions were the most surprising. The four resin systems examined were Interplastic Corporation VE 8300 vinyl ester, Ashland Chemical Company Aropol 7430 Polyester, and Shell Chemical Company Epon 9302 and Epon 9310 epoxides. Author

N87-15278# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
THE EFFECTS OF IMPLANTED DELAMINATIONS ON THE TENSILE STRENGTH OF GRAPHITE/EPOXY LAMINATES M.S. Thesis
Leonard M. Robichaux 1986 151 p
(AD-A171329; AFIT/CI/NR-86-130T) Avail: NTIS HC A08/MF A01 CSCL 11/4

The fracture of graphite/epoxy laminates implanted with materials to cause local delaminations was investigated both experimentally and analytically to assess the effects of the implants on the stress-strain behavior and ultimate tensile strength. Two different stacking sequences were examined: (+ or 45/0)s and (0/ + or - 45)s with a majority of the tests conducted on the first stacking sequence. Implant thickness, shape, size and configuration, which describes the number and location of the implants, were varied. All implants were centered in the specimen. All these variables except implant shape were discovered to affect the fracture strength of the laminate. Implants with thickness below 0.0127 mm will not reduce the fracture stress as observed for the thin implant utilized. Reductions in strength for thickness greater than this are a result of the stress redistribution in the plies due, in part, to an induced bending moment as each ply is forced to bend around the implant. Significant stress redistributions predicted by the model occur when more than one implant is embedded in a laminate. Multiple implants which isolate plies prevent a path for three-dimensional load transfer within the delaminated region. Thus, cracks which form in this region will grow quickly into splits until arrested by the laminated plies. These cracks reduce the bending stiffness and strength of the delaminated plies. This will cause the laminate to fail at a reduced stress level than it would otherwise. Author (GRA)

N87-15279# Boeing Military Airplane Development, Seattle, Wash.
FAILURE ANALYSIS OF COMPOSITE STRUCTURE MATERIALS Interim Report, 18 Jul. 1984 - 1 Oct. 1985
Brian Smith, Ray Grove, and Thomas Munns May 1986 240 p
(Contract F33615-84-C-5010)
(AD-A172236; AFWAL-TR-86-4033) Avail: NTIS HC A11/MF A01 CSCL 11/4

The objectives of the Failure Analysis for Composite Structural Materials program are to develop analytical and diagnostic techniques that can be used for determining the causes of failure in composite materials and to incorporate these results into a compendium of procedures which may be used as a reference manual when conducting a postfailure analysis of a composite structure, given the failed part as the starting point of the investigation. Such techniques include flowcharts describing the logical arrangement of investigative operations along with diagnostic procedures that will reveal the cause and mechanism of failure. To achieve these objectives, this program is divided into five tasks: literature search and diagnostic technique selection; specimen production and test; diagnostic technique evaluation; creation of a failure analysis compendium; and evaluation and demonstration of techniques. GRA

N87-15280# Westinghouse Research and Development Center, Pittsburgh, Pa.
THE USE OF MICRODIELECTROMETRY IN MONITORING THE CURE OF CARBON-EPOXY PREPREG Final Technical Report, Sep. 1984 - Sep. 1986
Z. N. Sanjana Sep. 1986 34 p
(Contract N00014-82-C-0164)
(AD-A172304; Rept-86-9B7-CURES-R1; FTR-3) Avail: NTIS HC A03/MF A01 CSCL 11/9

As thermosetting resins and composites made from them begin to be used in critical applications, it becomes necessary to monitor and analyze the cure of the resin within the confines of the processing equipment. Such measurements have been carried out using a dielectric technique called dielectrometry or dielectric analysis. Conventional dielectrometry has certain limitations associated with the use of parallel plate geometry for electrodes. For in situ measurement of cure, intrusiveness of electrodes is a problem which may require placement of electrodes in non-strategic areas. Since electrode spacing changes during cure, it is difficult to deduce permittivity and loss factor from the data. At lower frequencies the capacitive currents are small and signal-to-noise ratios are small, therefore, measurement at low frequencies (<100 Hz) typically require large electrode sizes. Results show that microdielectrometry can be used to follow the cure of the prepreg and absolute measurements of permittivity and loss factor

can be made to provide information on the mechanisms that produce the observed changes. Data at <1 Hz can be obtained. For these systems prior to gelation at typical cure temperatures, the data is often out of range of the instrument, requiring the use of a high conductivity option (which we do not have) for monitoring that regime of cure. Lower than expected permittivity values at the end of cure indicate some problems with resin separation from the chip surface. Experiments with aged prepegs are also described. GRA

N87-15281# Naval Ship Research and Development Center, Annapolis, Md. Ship Materials Engineering Dept.
THEORETICAL AND EXPERIMENTAL ANALYSIS OF MULTI-DIRECTIONALLY-BRAIDED COMPOSITES Departmental Report, Oct. 1983 - Sep. 1986
E. T. Camponeschi, Jr., L. L. Wall, and R. M. Crane Sep. 1986 72 p
(AD-A172694; DTNSRDC/SME-86/75) Avail: NTIS HC A04/MF A01 CSCL 11/4

The ability of multidirectionally (X-D) braided composites to contain damage is one of the major advantages offered by this material. This report describes the development of analytical methods for determining the fiber geometry, stiffness, and impact damage response of X-D braided composites. The fiber geometry model is based on the braid parameters used in the construction of X-D braided composites. The stiffness model is based on this fiber geometry model and laminated plate theory. The impact damage model is based on the braided fiber geometry and the fracture toughness of the resin system used in the X-D composite. This report also describes the results of experimental studies conducted to evaluate the results of the theoretical models. GRA

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N87-15282# Ames Lab., Iowa.
VACUUM ULTRAVIOLET PHOTOCHEMISTRY Ph.D. Thesis - Iowa State Univ.
Wen-Bih Tzeng Aug. 1986 238 p
(Contract W-7405-eng-82)
(DE86-015768; IS-T-1260) Avail: NTIS HC A11/MF A01

A new molecular beam laser photofragment time-of-flight mass spectrometer with rotatable beam source and movable detector has been constructed for studying photofragmentation dynamics of polyatomic molecules. The design considerations, detailed assembly and initial tests of this machine are described. The time-of-flight data of carbon disulfide laser photofragmentation at 193 nm have been taken at various beam source angles and fragment flight path lengths. The results give insight into the dynamics of the photofragmentation process. Author

N87-15283*# National Aeronautics and Space Administration, Washington, D.C.
AN OVERVIEW OF CVD PROCESSES
S. Okamoto Aug. 1986 25 p Transl. into ENGLISH from Jitsumu Hyomen Gijutsu (Japan), v. 32, no. 4, Apr. 1985 Transl. by SCITRAN, Inc., Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88450; NAS 1.15:88450) Avail: NTIS HC A02/MF A01 CSCL 07D

In this review, chemical vapor deposition (CVD) processes under normal or reduced pressures are examined critically, since they are now in practical usage. Several problems, which arise in much broader applications, are pointed out. New processes of CVD are also described. Superior characteristics of CVD are taken into account and they are applied in practical use. Author

N87-15284*# National Aeronautics and Space Administration, Washington, D.C.
THE BARIUM IRON RUTHENIUM OXIDE SYSTEM
S. Kemmler-Sack and A. Ehmann Oct. 1986 15 p Transl. into ENGLISH from Journal of Solid State Chemistry (West Germany), v. 44, no. 3, 1982 p 366-373 Transl. by The Corporate Word, Pittsburgh, Pa.
(Contract NASw-4006)
(NASA-TM-88451; NAS 1.15:88451) Avail: NTIS HC A02/MF A01 CSCL 07D

In the system BaFe(1-x)Ru(x)O(3-y), three phases, separated by immiscibility gaps, are present: an Fe-rich phase (x = 0 to 0.75) with hexagonal BaTiO3 structure (6H; sequence (hcc)2), a Ru-rich phase (x = 0.9) of hexagonal 4H-type (sequence (hc)2), and the pure Ru compounds BaRuO3 with rhombohedral 9R structure (sequence (hhc)3). By vibrational spectroscopic investigations in the 6H phase a transition from n-type semiconduction (Fe-rich compounds with complete O lattice) can be detected. The 4H and 9R stacking polytypes are good, metal-like conductors. The lattice parameters are given. Author

N87-15285*# National Aeronautics and Space Administration, Washington, D.C.
AUTOMATION OF PREPARATION OF NONMETALLIC SAMPLES FOR ANALYSIS BY ATOMIC ABSORPTION AND INDUCTIVELY COUPLED PLASMA SPECTROMETRY
A. Wittmann and G. Willay Aug. 1986 26 p Transl. into ENGLISH from Cahiers d'Informations Techniques/Revue de Metallurgie (France), v. 82, no. 5, 1985 p 399-410 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-88476; NAS 1.15:88476) Avail: NTIS HC A03/MF A01 CSCL 07D

For a rapid preparation of solutions intended for analysis by inductively coupled plasma emission spectrometry or atomic absorption spectrometry, an automatic device called Plasmasol was developed. This apparatus used the property of nonwettability of glassy C to fuse the sample in an appropriate flux. The sample-flux mixture is placed in a composite crucible, then heated at high temperature, swirled until full dissolution is achieved, and then poured into a water-filled beaker. After acid addition, dissolution of the melt, and filling to the mark, the solution is ready for analysis. The analytical results obtained, either for oxide samples or for prereduced iron ores show that the solutions prepared with this device are undistinguished from those obtained by manual dissolutions done by acid digestion or by high temperature fusion. Preparation reproducibility and analytical tests illustrate the performance of Plasmasol. Author

N87-15286*# SCITRAN, Inc., Santa Barbara, Calif.
STUDY OF THE KINETICS OF CATALYTIC DECOMPOSITION OF HYDRAZINE VAPORS ON PALLADIUM
A. A. Khomenko and L. O. Apelbaum Jan. 1987 11 p Transl. into ENGLISH from "Issledovaniye Kinetiki Kataliticheskogo Razlozheniya Parov Gidrazina na Palladii" Moscow (USSR), p 143-52 Transl. by SCITRAN, Inc., Santa Barbara, Calif. Original document was prepared by L. Ya. Karpov Scientific Research Phyicochemical Inst., Moscow, USSR
(Contract NASw-4004)
(NASA-TM-88549; NAS 1.15:88549) Avail: NTIS HC A02/MF A01 CSCL 07D

The decomposition rates of N2H4 on a palladium surface are studied. Experiments were conducted in a circulating unit at atmosphere pressure. The experimental method is described. The laws found for the reaction kinetics are explained by equations. Author

N87-15287# Wisconsin Univ., Milwaukee. Dept. of Chemistry.
SEVENTH INTERNATIONAL SUMMER INSTITUTE IN SURFACE SCIENCE Final Report, 4 Apr. - 31 Dec. 1985
Ralf Vanselow 20 Aug. 1986 14 p Meeting held in Milwaukee, Wis., 1985 Submitted for publication
(Contract N00014-85-G-0140)

(AD-A171449; Rept-144-W676) Avail: NTIS HC A02/MF A01 CSCL 07/4

Paper topics: Surface Structure Analysis by Low Energy Alkali Ion Scattering; Scanning Tunneling Microscopy-A Critical Review; Georg Maria Schwab: Early Endeavours in the Science of Catalysis; Raman Spectroscopy of Adsorbed Molecules; Inverse Photoemission Spectroscopy; Multilayer Films Wetting Behavior; Molecular Organometallic Chemistry and Catalysis on Metal Oxide Surfaces; Effects of Promoters and Poisons on Surface Reactions; Thermodynamics and Kinetics in Weakly Chemisorbed Phases; The Life and Times of Paul H. Emmett; Catalysis by Molybdena Alumina and Related Systems; Surface Electronic States; Use of Spin Polarized Electrons in Surface Analysis; Stable Intermediates on Transition Metal Surfaces; Field Emission Microscopy - Trends and Perspectives; Wetting - An Experimenter's View; Catalysis by Metals; High Resolution Electron Microscopy in Surface Science; Structure and Catalytic Performance of Zeolites; Elastic and Inelastic Electron Scattering for Surfaces; Time of Flight Atom Probe Studies of Gas Surface Interactions; and Kinetic and Spectroscopic Investigations of Surface Chemical Processes. GRA

N87-15288# Department of the Navy, Washington, D. C.
APPARATUS FOR DETERMINING THE LIQUID WATER CONTENT OF A GAS Patent
Hermann E. Gerber, inventor (to Navy) and Bernard G. Ulfers, inventor (to Navy) Issued 1 Jul. 1986 7 p Supersedes AD-D011297
(AD-D012453; US-Patent-4,597,666; US-Patent-Appl-SN-601516; US-Patent-Class-356-338) Avail: US Patent and Trademark Office CSCL 14/2

This patent discloses an apparatus for determining the liquid water contents (LWC) of a sample gas having water droplets suspended therein includes a light source for passing a collimated light beam through the sample gas, and a sensor for detecting the light scattered by the water droplets. The sensor includes a photodetector having a planar light sensitive surface positioned to receive scattered light. A light trap is also provided between the photodetector and the light source for blocking nonscattered light in the light beam from the photodetector. The light flux detected by the photodetector is proportional to LWC. GRA

N87-15289# Science Applications, Inc., Chatsworth, Calif. Combustion Science and Advanced Technology Dept.
PRESSURE INTERACTIONS IN SUPERSONIC COMBUSTION Final Report, 1 Jun. 1984 - 28 Feb. 1986
R. B. Edelman and W. N. Bragg 11 Jun. 1986 58 p
(Contract F49620-84-C-0064)
(AD-A172711; AFOSR-86-0876TR) Avail: NTIS HC A04/MF A01 CSCL 21/2

A detailed assessment of supersonic combustion was carried out to identify specific research requirements in modeling turbulent reacting supersonic flows. The direct effects of pressure gradients and pressure fluctuations on turbulence were found to be potentially responsible for certain of the trends in turbulent transport and mixing rates that are observed in supersonic flows. An approach to the modeling of these phenomena is delineated. A modular model computer code for the analysis of sudden expansion (dump) combustors was prepared. This modular model is designed to be used parametrically in evaluating effects such as chemical kinetics limitation on flame stabilization and combustion efficiency in integral rocket ramjet and ducted rocket combustors. GRA

N87-15290# California Univ., Berkeley. Dept. of Mechanical Engineering.
APPLICATION OF RAYLEIGH SCATTERING TO TURBULENT FLOW WITH HEAT TRANSFER AND COMBUSTION Final Report, 1 May 1985 - 30 Apr. 1986
L. Talbot 9 Jun. 1986 10 p
(Grant AF-AFOSR-0124-84)
(AD-A172934; AFOSR-86-0881TR) Avail: NTIS HC A02/MF A01 CSCL 41/2

Studies of premixed turbulent V-shaped flames have been carried out using two-point Rayleigh scattering. Density fluctuation intensities, two-point density covariances, and mean density profiles were found to be in good agreement with a wrinkled laminar flame model which is an extension of the Bray-Moss-Libby model. The probability density function for the location of the flame brush was measured and found to have a self-similar behavior when scaled with the maximum slope thickness. A new optical technique was developed to make time-resolved Rayleigh scattering measurements along a length of a laser beam, thus extending the two-point technique to a multipoint one. The technique has been applied to the investigation of the dynamics of V-shaped premixed turbulent flames. Some of the findings are that incident turbulence controls flame motion in the frequency range 100-100 Hz, and that an increase in heat release for a given incident turbulence intensity increases the amplitude of the flame fluctuations without modifying their spectral characteristics. GRA

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N87-15291# Technion - Israel Inst. of Tech., Haifa. Dept. of Aeronautical Engineering.
EFFECT OF COLD-WORKING BY HOLE EXPANSION ON FATIGUE LIFE OF 7075-T7351 AND 7475-T761 ALUMINUM LUGS WITH AND WITHOUT INITIAL FLAWS UNDER MANEUVER LOADING SPECTRUM
A. Buch and A. Berkovits Jan. 1985 19 p
(TAE-561) Avail: NTIS HC A02/MF A01

The effect of cold working by hole expansion on fatigue life of aircraft lugs under maneuver and constant amplitude loading was investigated. Of the two nominal expansion levels used, 2 percent expansion resulted in greater life improvement than the larger expansion of 3.3 percent. The reason for this was the relatively small w/d ratio and lug head shape distortion caused by the larger expansion. The hole expansion had a more beneficial effect in the case of lugs with 1 mm deep initial flaws than lugs without flaws. Hole expansion considerably improved the damage tolerence of the lugs investigated. Author

N87-15292# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.
TENSILE BEHAVIOR OF HELIUM-IMPLANTED AND NEUTRON-IRRADIATED V-15Cr-5TI
M. L. Grossbeck and J. A. Horak 1986 8 p
(Contract DE-AC05-84OR-21400)
(DE86-007301; CONF-860-610-18) Avail: NTIS HC A02/MF A01

Vandium alloys are being considered for use for first-wall and blanket structures in fusion reactors due to their high melting points and low neutron activation. The alloy to be reported here, V-15Cr-5Ti, was prepared by Westinghouse Advanced Reactors Division (Heat HSV-307). Since the fusion environment produces helium in all common structural alloys including vanadium, the effect of helium in irradiated alloys was investigated. In a fusion reactor spectrum, about 5 at. ppm He/dpa is expected. Ideally, the helium should be produced concurrently with displacement damage. However, since this is difficult or impossible in vanadium without a source of high energy neutrons, cyclotron implantation of helium followed by fission reactor irradiation was chosen. By this method it was hoped to qualitatively scope the effect of helium alone and the synergistic effect of helium in conjunction with neutron irradiation. Author

N87-15293# Technical Research Centre of Finland, Espoo.
CORROSION AND STRESS CORROSION OF STEEL PRESSURE BOUNDARY COMPONENTS AND STEAM TURBINES
J. Forsten, ed. 1984 413 p Presented at the International Atomic Energy Agency Specialist Meeting, Espoo, Finland, 22-24 Nov. 1983
(DE86-780555; VTI-SYMP-43) Avail: NTIS HC A18/MF A01

Lectures and the conclusions and recommendations from the IAEA specialists' meeting are presented. Topics addressed include: stress corrosion; stress corrosion cracking; carbide growth; crack growth in reactor vessels; fatigue in stainless steel; strain rate tests; hydrogen embrittlement; environmental effects; steam turbines; and erosion. B.G.

N87-15294# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.
METALLURGICAL VARIABLES INFLUENCING THE CORROSION SUSCEPTIBILITY OF P/M (POWDER METALLURGY) 7091 ALUMINUM/SiCw COMPOSITE Final Report
Richard C. Paciej and Vinod S. Agarwal 1 Oct. 1985 38 p
(AD-A170946; NADC-86071-60) Avail: NTIS HC A03/MF A01 CSCL 11/6

Corrosion studies of a 20 v/o SiCw/P/M 7091 aluminum composite material were performed. The plate material which was heat treated to the T-6 and T-7 temper by conventional methods, showed preferential corrosion of the surface layers up to 2 mm thick. The regions of corrosion susceptibility were determined to be due to improper processing and thermal treatments. Cold worked regions due to extrusion were not completely removed by the conventional solution treatment and thus appeared as more corrosion susceptible. Large void volume fraction and excessive segregation of SiCw was also noted. Electrochemical, microscopic and analytical techniques were used in these investigations. Attempts were made to remove the cold worked regions and study the resultant corrosion properties. A comparative analysis of these results is discussed. Author (GRA)

N87-15295# Virginia Univ., Charlottesville. Dept. of Materials Science.
INVESTIGATION OF THE ELASTIC BEHAVIOR OF Al-Li-X ALLOYS Annual Letter Report, 1 Jun. 1985 - 31 May 1986
Wolfgang Ruch and E. A. Starke, Jr. 27 Jun. 1986 5 p
(Contract N00014-85-K-0526)
(AD-A171224; UVA/525400/MS87/101) Avail: NTIS HC A02/MF A01 CSCL 11/6

The goal of this research is to identify and understand critical parameters governing the elastic moduli of commercially important Al-Li-X alloys (X designates copper, magnesium or both). The basic knowledge gained during the project can be used toward further development aluminum-lithium alloys in terms of optimized stiffness. The Young's modulus, shear modulus and Poisson's ratio are calculated from the density and the propagation rate of longitudinal and transverse 10 MHz ultrasonic waves. GRA

N87-15296# Lehigh Univ., Bethlehem, Pa. Inst. of Fracture and Solid Mechanics.
CORROSION FATIGUE AND ELECTROCHEMICAL REACTIONS IN MODIFIED HY130 STEEL
Gunchoo Shim and R. P. Wei May 1986 41 p
(Contract N00014-83-K-0107)
(AD-A172242; IFSM-86-142; TR-18) Avail: NTIS HC A03/MF A01 CSCL 11/6

To investigate the relationship between corrosion fatigue crack growth response of high strength steels in aqueous environments and electrochemical reactions at the crack tip, fatigue and electrochemical simulation tests were carried out on a modified HY-130 steel in acetate buffer solution. Corrosion fatigue crack growth rate were determined as a function of temperature (276 to 363 K) and frequency (0.03 to 10 Hz) under open circuit conditions. The electrochemical simulation experiments were carried out over the same range of temperatures, and measured the galvanic current transient between a clean and an oxidized surface and the corresponding mixed potential. These experiments were based on the assumption that the newly created surfaces at the crack tip and its neighboring oxidized surfaces formed a localized galvanic cell. Results from the two sets of experiments strongly suggested electrochemical reaction control of corrosion fatigue crack growth. The electrochemical experiments indicated that hydrogen evolution in this system followed the Volmer-Heyrovsky mechanism. GRA

N87-15297# Lehigh Univ., Bethlehem, Pa. Inst. of Fracture and Solid Mechanics.
ELECTROCHEMICAL REACTIONS WITH BARE METAL SURFACES AND CORROSION FATIGUE CRACK GROWTH
A. Alavi, C. D. Miller, and R. P. Wei May 1986 33 p
(Contract N00014-83-K-0107)
(AD-A172248; IFSM-86-143; TR-19) Avail: NTIS HC A03/MF A01 CSCL 11/6

To assist in the understanding of corrosion fatigue crack growth in aqueous environments, an in situ fracture technique for measuring the kinetics of electrochemical reactions with bare metal surfaces has been developed and evaluated. The experimental procedure and preliminary results are described and discussed. Preliminary evidence that supports a direct connection between the extent of electrochemical reactions and corrosion fatigue crack growth is given. The potential of this approach in advancing the understanding of corrosion fatigue is discussed. GRA

N87-15298# Cincinnati Univ., Ohio. Dept. of Civil and Environmental Engineering.
AN ENDOCHRONIC RATE-SENSITIVE CONSTITUTIVE EQUATION FOR METALS: APPLICATION TO GENERALIZED CREEP Technical Report, 1 Dec. 1984 - 30 Nov. 1985
K. C. Valanis, C. F. Lee, and S. D. Lee Aug. 1986 45 p
(Contract DAAG29-85-K-0001)
(AD-A172705; ARO-21663.1-EG) Avail: NTIS HC A03/MF A01 CSCL 11/6

A constitutive equation is proposed with a view to describing the rate dependent mechanical response of metals at high temperatures. The equation is of the endochronic type and derives its physical foundations from deformation kinetics. Of importance is the fact that hardening is associated with a change in the energy barriers brought about by the inelastic deformation of a metal. The equation is used to describe the results, by Ohno and his associates, of experiments on the creep response of metals to piece-wise constant stress histories. The metal in the present case is 304 stainless steel at 600 C. It is shown that the theory gives analytical results that are in close agreement with experiment. Of consequence is the fact that the constitutive equation applies to three-dimensional stress or strain histories and is thus not limited to those stress histories associated with creep. GRA

N87-15299# Denver Univ., Colo. Dept. of Physics.
DETECTING AND MONITORING CRACK GROWTH IN AUSTENITIC AND FERRITIC STEELS Progress Report, 1 Dec. 1985 - 30 Nov. 1986
S. H. Carpenter Jul. 1986 19 p
(Contract DE-FG02-85ER-45182)
(DE86-014348; DOE/ER-45182/2) Avail: NTIS HC A02/MF A01

The program has been mainly concerned with the use of acoustic emission measurements and signal analysis to detect, monitor and identify the mode of crack growth. Treatments have been developed which produce four distinct and different modes of crack growth in 304 stainless steel. The acoustic emission has been measured from each of these four types of crack growth using cantliver specimens. The waveforms have been recorded and careful analysis is underway to characterize the emissions. It appears that it will be possible to identify the mode of crack growth from characteristics of the measured acoustic emissions. DOE

N87-15300# Idaho National Engineering Lab., Idaho Falls.
ULTRASONIC BACKSCATTER AND ATTENUATION MEASUREMENTS FOR MICROSTRUCTURE CHARACTERIZATION: APPLICATION TO CONSOLIDATED RAPIDLY SOLIDIFIED TYPE 304 STAINLESS STEEL POWDER
K. L. Telschow and J. E. Flinn Mar. 1986 41 p
(Contract DE-AC07-76ID-01570)
(DE86-014917; EGG-SCM-7198) Avail: NTIS HC A03/MF A01

Ultrasonic measurements of attenuation and backscatter energy can be correlated with microstructural features in the RSP consolidated materials utilized. Attenuation and backscatter energy are consistent with each other and yield approximately the same

microstructural information. The backscatter technique can be implemented more easily than the attenuation measurement as it requires access to only one surface of the sample under study. More information is available in the backscatter signals, but as yet is not understood well enough to be utilized. The high degree of correlation between the microstructural examinations and the ultrasonic measurements allows the latter to be of use in evaluating the effectiveness of various consolidation methods. This study has concentrated on explosive consolidation, illustrating the differences in microstructure that can be obtained from starting with powders prepared by different processes. Clearly, the large differences observed through conventional metallographic examination were also observed in the ultrasonic tests. Finally, the consolidation process itself was characterized ultrasonically by comparison with the results on the hot extruded specimen. DOE

N87-15301# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
OBSERVATIONS OF HIERARCHAL GRAIN BOUNDARY DISLOCATION STRUCTURES IN [001] SYMMETRIC TILT BOUNDARIES IN GOLD
E. P. Kvam and R. W. Balluffi Aug. 1986 28 p Prepared in cooperation with Liverpool Univ., England
(Contract DE-FG02-84ER-45116)
(DE86-015729; DOE/ER-45116/13) Avail: NTIS HC A03/MF A01

Molecular statics calculations using pairwise interatomic potentials by Sutton, Vitek and Wang have predicted the existence of a hierarchy of localized edge-type grain boundary dislocations (GBDs) in [001] symmetric tilt boundaries in fcc noble metals. Furthermore, the geometry of these GBDs can be well described by the Structural Unit/GBD model of Sutton and Vitek as extended by Balluffi and Bristowe. In the present work, a search was made for the presence of such a hierarchy in [001] symmetric tilt boundaries in gold by means of transmission electron microscopy. Numerous arrays of various localized GBDs were detected under various conditions of observation in specimens of differing thickness under different imaging conditions. When the present results are combined with results from other investigations, it is concluded that the first four members of the hierarchy have been detected. One GBD array belonging to an appreciably higher order hierarchal member has been found, and it seems likely that higher order members (which became increasingly difficult to detect) also exist. The results provide support for both the calculations and the Structural Unit/GBD model. DOE

N87-15302# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
REPORT OF A DISCUSSION MEETING ON THE STRUCTURE OF INTERNAL INTERFACES
R. W. Balluffi, M. Ruehle, and A. P. Sutton 1986 44 p Prepared in cooperation with Max-Planck-Institut fuer Metallforschung, Stuttgart, West Germany and Oxford Univ., England
(Contract DE-FG02-84ER-45116)
(DE86-015730; DOE/ER-45116/14) Avail: NTIS HC A03/MF A01

Described briefly are the main conclusions reached at a small two and a half day discussion meeting concerned with the Structure of Internal Interfaces which was held at the Max Planck Institut fuer Metallforschung in Stuttgart, West Germany, during 29 to 31 January, 1986. The purpose of this meeting was to discuss critically a limited number of selected topics which were thought to be of particular current interest in the field: evaluation of a number of the main experimental techniques with particular emphasis on their limitations and the roles that they might play in future work; evaluation of efforts to calculate interfacial structure with particular emphasis on the problems associated with current techniques and the possibilities of developing better approximations; and discussions of the status of several structural phenomena at interfaces which are currently controversial. DOE

N87-15303*# Georgia Inst. of Tech., Atlanta. School of Materials Engineering.
HIGH TEMPERATURE MONOTONIC AND CYCLIC DEFORMATION IN A DIRECTIONALLY SOLIDIFIED NICKEL-BASE SUPERALLOY
Eric S. Huron May 1986 172 p
(Contract NAG3-503)
(NASA-CR-175101; NAS 1.26:175101; AD-A171480; USAAVSCOM-TR-86-C-19) Avail: NTIS HC A08/MF A01 CSCL 11F

Directionally solidified (DS) MAR-M246+Hf was tested in tension and fatigue, at temperatures from 20 C to 1093 C. Tests were performed on (001) oriented specimens at strain rates of 50 % and 0.5 % per minute. In tension, the yield strength was constant up to 704 C, above which the strength dropped off rapidly. A strong dependence of strength on strain rate was seen at the higher temperatures. The deformation mode was observed to change from heterogeneous to homogeneous with increasing temperature. Low Cycle Fatigue tests were done using a fully reversed waveform and total strain control. For a given plastic strain range, lives increased with increasing temperature. For a given temperature strain rate had a strong effect on life. At 704 C, decreasing strain rates decreased life, while at the higher temperatures, decreasing strain rates increased life, for a given plastic strain range. These results could be explained through considerations of the deformation modes and stress levels. At the higher temperatures, marked coarsening caused beneficial stress reductions, but oxidation limited the life. The longitudinal grain boundaries were found to influence slip behavior. The degree of secondary slip adjacent to the boundaries was found to be related to the degree of misorientation between the grains. GRA

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

For composite materials see *24 Composite Materials.*

N87-15304* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PROCESS FOR CURING BISMALEIMIDE RESINS Patent
John A. Parker, inventor (to NASA), Alvin H. Heimbuch, inventor (to NASA), Ming-ta S. Hsu, inventor (to NASA) (San Jose State Univ., Calif.), and Timothy S. Chen, inventor (to NASA) (San Jose State Univ., Calif.) Issued 21 Oct. 1986 10 p Division of US-Patent-4,526,925, US-Patent-Appl-SN-553339, filed 18 Nov. 1983
(NASA-Case-ARC-11429-4; US-Patent-4,618,652; US-Patent-Appl-SN-725686; US-Patent-Class-525-282) Avail: US Patent and Trademark Office CSCL 07B

This invention relates to vinyl pyridine group containing compounds and oligomers, their advantageous copolymerization with bismaleimide resins, and the formation of reinforced composites based on these copolymers. When vinyl pyridines including vinyl stilbazole materials and vinyl styrylpyridine oligomer materials are admixed with bismaleimides and cured to form copolymers the cure temperatures of the copolymers are substantially below the cure temperatures of the bismaleimides alone. NASA

N87-15305*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ADHESION, FRICTION, AND DEFORMATION OF ION-BEAM-DEPOSITED BORON NITRIDE FILMS
Kazuhisa Miyoshi, Donald H. Buckley, Samuel A. Alterovitz, John J. Pouch, and David C. Liu 1987 16 p Prepared for presentation at the International Conference on Tribology, London, England, 1-3 Jul. 1987; Institution of Mechanical Engineers
(NASA-TM-88902; E-3326; NAS 1.15:88902) Avail: NTIS HC A02/MF A01 CSCL 11G

The tribological properties and mechanical strength of boron nitride films were investigated. The BN films were predominantly amorphous and nonstoichiometric and contained small amounts

of oxides and carbides. It was found that the yield pressure at full plasticity, the critical load to fracture, and the shear strength of interfacial adhesive bonds (considered as adhesion) depended on the type of metallic substrate on which the BN was deposited. The harder the substrate, the greater the critical load and the adhesion. The yield pressures of the BN film were 12 GPa for the 440C stainless steel substrate, 4.1 GPa for the 304 stainless steel substrate, and 3.3 GPa for the titanium substrate. Author

N87-15306# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Aero-Propulsion Lab.

CARBON RESIDUE STUDIES WITH A MICRO CARBON RESIDUE TESTER Final Report, Nov. 1984 - Oct. 1985

Wilhelm Bochartz Jun. 1986 71 p

(AD-A171153; AFWAL-TR-85-2099) Avail: NTIS HC A04/MF A01 CSCL 11/8

A test procedure for the coking propensity of gas turbine lubricants was developed using the Micro Carbon Residue Tester-100 (MCRT-100). The MCRT-1009, a microprocessor controlled heating unit, was evaluated for its ability to determine carbon residue in weight percent of synthetic gas turbine lubricants under controlled static conditions (various time/temperature profiles and selected gas atmospheres). The purpose was to yield information on the amount of deposit remaining in glass vials after a measured volume of lubricant had been exposed to different degrading environments, varying the parameters of temperature, gas (air or nitrogen), and exposure time. During a test, several processes occur simultaneously. The major effect is volatilization of the lubricant. Substantial oxidation and thermal degradation of the lubricant also occurs, which forms residue in the glass vials. The degradation of the lubricant is not completely realistic because the evaporated oil is caught in the condensate trap of the MCRT-100, whereas condensate returns to the bulk oil in an engine and affects viscosity, acidity, and the degradation of the lubricant. GRA

N87-15307# Massachusetts Inst. of Tech., Cambridge. Dept. of Polymer Science and Engineering.

MECHANICAL PROPERTIES VERSUS MORPHOLOGY OF ORDERED POLYMERS, VOLUME 6 Final Report, 1 Sep. 1983 - 31 Aug. 1984

Edwin L. Thomas, R. J. Farris, and S. L. Hsu Jun. 1986 131 p

(Contract F33615-82-K-5068)

(AD-A171221; AFWAL-TR-85-4151-Vol-6) Avail: NTIS HC A07/MF A01 CSCL 11/9

This project seeks to determine for rigid rod polymer fibers and films of poly(p-phenylene benzobisthiazole) the relationships between mechanical properties and sample microstructures and to use this knowledge to obtain the maximum in strength and modulus for these materials. Structural studies involved primarily optical microscopy, electron microscopy (both scanning and transmission) and wide angle X-ray scattering. Spectroscopic studies employed Fourier transform infrared spectroscopy. Mechanical behavior was measured in uniaxial tension over a range of strain rates and temperatures. A special force-temperature apparatus permitted assessment of the thermal expansion coefficient of PBT. The microstructural studies concentrated on the structure developed during the fast coagulation stage of the spinning process, as well as the structure obtained by slow coagulation of a quiescent isotropic polymer solution. Growth of crystal solvates in the PBT/MSA system was observed for the first time through the slow diffusion of water into the quiescent isotropic solution. Phase behavior was investigated and a pseudo-binary schematic phase diagram for the PBT/MSA.H2O system was developed. GRA

N87-15308# Massachusetts Inst. of Tech., Cambridge. Microsystems Technology Labs.

DIELECTRIC ANALYSIS OF THE CURE OF THERMOSETTING EPOXY/AMINE SYSTEMS Technical Report, May 1985 - Aug. 1986

Norman F. Sheppard, Jr. and Stephen D. Senturia 18 Aug. 1986 11 p

(Contract N00014-84-K-0274)

(AD-A171274; TR-5) Avail: NTIS HC A02/MF A01 CSCL 11/9

The conductivity of seven epoxy resins of varying molecular weights were studied (without hardener) as a function of temperature. In addition, a low molecular weight resin was cured isothermally with an aromatic amine hardener and the conductivity was measured as a function of cure time. The conductivities of the resins without hardener obey a Williams-Landel-Ferry relation, and by incorporating a cure-dependent glass transition temperature into this relation, the observed behavior of the resin-plus-hardener system can be modeled. GRA

N87-15309# Pennsylvania State Univ., University Park. Materials Research Lab.

FERROIC SHAPE MEMORY MATERIALS AND PIEZO:PYROELECTRIC ORIENTED RECRYSTALLIZED GLASSES Final Report, 1 Apr. 1983 - 31 Mar. 1986

R. E. Newnham, A. S. Bhalla, A. Halliyal, E. Ylo, and S. A. Markgraf Jul. 1986 158 p

(Contracts DAAG29-83-K-0062; DAAG46-84-K-0002)

(AD-A171409; ARO-18953.15-PH) Avail: NTIS HC A08/MF A01 CSCL 11/2

This final report summarizes the work on ferroic shape memory materials, and piezo:pyro electric oriented recrystallized glasses. In this program a new family of electroceramic materials--grain oriented polar glass ceramics were developed. An extensive study of piezoelectric and pyroelectric properties of a number of polar glass-ceramics was carried out. From the work carried out in this contract period, several polar glass-ceramic compositions useful for pyroelectric detectors and hydrophones have been identified. GRA

N87-15310# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.

CHALCOGENIDE GLASSES. PART 4: CRYSTALLIZATION AND GLASS TRANSITION CHARACTERISTICS IN As(2-x)Sb(x)S(3) GLASS-FORMING SYSTEM Final Report, 1 Nov. 1983 - 31 Mar. 1986

Koto White, Robert L. Crane, and James A. Snide Jun. 1986 167 p

(AD-A171564; AFWAL-TR-86-4075) Avail: NTIS HC A08/MF A01 CSCL 01/2

The crystallization characteristics of As2xSbxS3 chalcogenide glasses with nominal compositions ranging from x=0.0 to 2.0 in a melt quenched bulk form and a thin film form were studied, and a self-consistent model of crystallization mechanism was developed. Scanning electron microscopy and X-ray diffraction analysis were used to examine the microstructure and phases present as a function of composition. Differential scanning calorimetry, both in isothermal and dynamic mode, was utilized to determine the kinetic parameters, glass forming tendency, and glass transition characteristics as a function of composition. All results for the melt quenched bulk glasses were consistent with the proposed model in which: (1) the glasses exhibit two phase heterogeneity consisting of Sb2S3 phase and As2S3 matrix phase, (2) the nucleation sites are at the surface of the bulk in the Sb2S3 phase, and (3) the Sb2S3 crystals grow in the glassy As2S3 matrix by diffusion of antimony atoms through As2S3 phase, and subsequent inter-connection of Sb2S3 phase. The experimental results with the vapor deposited film samples suggested a slightly different model, in which no heterogeneity existed in the as-deposited state. GRA

N87-15311# Massachusetts Inst. of Tech., Cambridge. Dept. of Chemical Engineering.

CONDENSATION POLYMERS WITH CONTROLLED STRUCTURE Annual Report, 1 Aug. 1985 - 31 Jul. 1986

Ulrich W. Suter, Werner R. Meyer, and Frank T. Gentile 4 Aug. 1986 21 p

(Contract N00014-85-K-0161)

(AD-A172283) Avail: NTIS HC A02/MF A01 CSCL 11/9

The polymerization procedure that had been used in the first year of funding was improved dramatically during the current period. A homogenous condensation system for the Modified Schotten-

Baumann reaction at ambient temperatures has been found (NMP:THF = 10:1, +3%w/w LiCl) that routinely yields polymers with a degree of polymerization sufficient to form fibers and that allows for the slow addition of one of the reagents to the others without side reactions. We have now synthesized poly(2,6-dichloro-p-phenyleneterephthalamide), and poly (2-methoxy-p-phenyleneterephthalamide) with the new system. It has been determined, both theoretically and experimentally, that they form liquid crystalline solutions at concentrations similar to those of the non-substituted polymer (i.e., Kevlar). Thus far, poly(2,6-dichloro-p-phenyleneterephthalamide) has been synthesized in ordered and random forms and we are devising new NMR techniques to quanitatively determine this order. Solubility differences between the ordered and the random chains are striking. GRA

N87-15312# Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Adhesion Science.
AN INTERDISCIPLINARY APPROACH TO PREDICTIVE MODELING OF STRUCTURAL ADHESIVE BONDING. CHARACTERIZATION OF TI-6AI-4V OXIDES AND THE ADHESIVE/OXIDE INTERPHASE Semiannual Report, Sep. 1985 - Mar. 1986
J. A. Filbey and J. P. Wightman Aug. 1986 36 p
(Contract N00014-82-K-0185)
(AD-A172313; CAS/CHEM-6-86; Rept-88) Avail: NTIS HC A03/MF A01 CSCL 11/1

Ti-6Al-4V, a high strength, light weight corrosion resistant alloy, possesses many applications for structural adhesive bonding. This report covers the interaction of pretreated surfaces with heat, alkoxide primers, thin polymer films, structural epoxy, and hostile environments. The stability of the oxides at temperatures of 450 C is shown. Alkoxide primers enhance the durability of adhesively bonded aluminum. Characterization of alkoxide primers on Ti-6-4 has begun as well as evaluation of these primers in the wedge test. Thin polymer films on polished titanium are studied by grazing angle infrared spectroscopy. STEM, AES and XPS show the penetration of FM-300 into the porous oxide of CAA. Finally, the wedge test examines pretreatment stability in a variety of environments. GRA

N87-15313# Air Force Academy, Colo. Research Lab.
MOPAC MANUAL (VERSION 3.10): A GENERAL MOLECULAR ORBITAL PACKAGE, IBM-PC VERSION, 1ST EDITION Report, period ending Jun. 1986
Norman E. Heimer, Jon T. Swanson, and James J. Stewart 20 Aug. 1986 129 p
(AD-A172361; FJSRL-TR-86-0006) Avail: NTIS HC A07/MF A01 CSCL 07/4

MOPAC is a general-purpose, semi-empirical molecular orbital program for the study of chemical reactions involving molecules, ions, and linear polymers. It implements the semi-empirical Hamiltonians MNDO, AMI and MINDO/3 and combines the calculations of vibrational spectra, thermodynamic quantities, isotopic substitution effects, and force constants in a fully integrated program. Elements parametrized at the MNDO level include H, Li, Be, B, C, N, O, F, Al, Si, P, S, Cl, Cr, Ge, Br, Sn, Hg, Pb, and I. Within the electronic part of the calculation, molecular and localized orbitals excited states up to sextets, chemical bond indices, charges, etc. are computed. Both intrinsic and dynamic reaction coordinates can be calculated. A transition-state location routine and two transition-state optimizing routines are available for studying chemical reactions. GRA

N87-15314# Massschusetts Inst. of Tech., Cambridge.
AGING OF POLYURETHANE FOAMS, THE INFLUENCE OF GAS DIFFUSION ON THERMAL CONDUCTIVITY
A. G. Ostrogorsky and L. R. Glicksman Aug. 1986 111 p
(Contract DE-AC05-84OR-21400)
(DE86-014339; ORNL/Sub-84-9009/2) Avail: NTIS HC A06/MF A01

It was shown that gas diffusion in closed-cell foams is driven by partial pressure only and not by temperature gradient. The value of the foam effective thermal conductivity can be predicted rapidly and accurately by the developed ECVA code, when the diffusion coefficients of N, O, CO and fluorocarbon 11 are known. The code can predict the aging rate in different thermal environments. The effective diffusion coefficient can be obtained with sufficient accuracy from the analytical or electrical model, or can be measured directly by the rapid steady state technique. It was found that porous layers exists at the foam/facing interface and inside of the foam panels. By eliminating these layers, the aging performance of the foam can be substantially improved. DOE

N87-15315# Ingenieurbuero Schroeder G.m.b.H., Hoehr-Grenzhausen (West Germany).
DEVELOPMENT OF COATING MATERIALS AND FEEDING PROCESSES FOR ENERGY-OPTIMIZED BAKING OF CARBON PRODUCTS Final Report, Mar. 1985
Klaus Juergen Schroeder, Paul Schroeder, and Bernhard Grimm Bonn, West Germany Bundesministerium fuer Forschung und Technologie Jan. 1986 75 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-86-001; ISSN-0340-7608; ETN-86-98285) Avail: NTIS HC A04/MF A01, Fachinformationszentrum, Karlsruhe, West Germany DM 16

Ceramic coating materials for carbon products were tested to obtain shorter baking times and lower energy consumption, application techniques, and baking processes. The results show that carbon products of perfect quality can be obtained within much shorter baking times. Tests at a factory producing refractory products during 1yr show energy savings of 70%. For the production of carbon anodes in the aluminum industry, energy savings up to 50% are possible. Corresponding plant designs were developed. ESA

N87-15316# Texas Technological Coll., Lubbock. Glass Research and Testing Lab.
STRUCTURAL-MECHANICS BEHAVIOR OF INSULATING GLASS UNITS Final Report
G. D. Chou, J. E. Minor, and C. V. G. Vallabhan Jul. 1986 78 p
(Grants NSF CEE-81-18214; NSF ECE-85-00620)
(PB86-234614; TTU-IDR-77D) Avail: NTIS HC A05/MF A01 CSCL 11B

Structural-mechanics behavior of insulating glass (IG) units is addressed by considering the interactive behavior of thin glass plates coupled by a sealed airspace. Of central interest to designers of IG units is a set of 25 graphs which provide the percent of an applied pressure that is carried by the loaded glass plate. GRA

N87-15765# Osaka Univ. (Japan). Dept. of Electrical Engineering.
PHOTOINDUCED EFFECTS IN POLYTHIOPHENE FILM
Taketora Shiraishi, Keiichi Kaneto, and Katsumi Yoshino *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 329-334 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; their storage and handling procedures; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N87-15317*# National Aeronautics and Space Administration, Washington, D.C.
THE USE OF ELECTRICAL DISCHARGE FOR IGNITION AND CONTROL OF COMBUSTION OF SOLID PROPELLANTS
Takeshi Tachibana, Tsuruo Kobayashi, Takashi Matsuda, and Itsuro Kimura Jan. 1987 11 p Transl. into ENGLISH from Nipponese Journal of Aeronautics and Space Society (Japan), v. 33, no. 378, 1985 Original language document was announced in IAA as

A86-25218 Transl. by SCITRAN, Inc., Santa Barbara, Calif. (Contract NASw-4004)
(NASA-TM-88548; NAS 1.15:88548) Avail: NTIS HC A02/MF A01 CSCL 21I

As the first step of the study of the combustion control of solid propellants by electrical discharges, the effects of an arc discharge, which flows along the burning surface, on the burning rate and on the increase of enthalpy of the combustion product were investigated. For specially devised composite propellants, which are composed of Al and Teflon powders, it was shown that the combination can be controlled by an arc discharge; the combustion continues when the arc discharge is applied and is interrupted when the arc discharge breaks. In the present investigation, it was also shown that an arc discharge coupled with a high-frequency electrical discharge has potential as an effective ignition method for solid propellants. For the application of this type of combustion control to an ignitor for a solid propellant rocket motor or to a control rocket motor, this method lacks flexibility in the configuration scale and needs relatively high electric power at the present stage. Author

N87-15318# Southwest Research Inst., San Antonio, Tex. Fuels and Lubricants Research Facility.
DEVELOPMENT OF REFEREE FUELS FOR IMPROVED ARMY MULTIFUEL ENGINE DESIGN Interim Report, 1 Jan. 1981 - 31 Dec. 1985
John N. Bowden, Edwin C. Owens, and Maurice E. LePera Jul. 1986 40 p
(Contracts DAAK70-85-C-0007; DAAK70-82-C-0001; DA Proj. 1L7-62733-AH-20)
(AD-A171143; BFLRF-172) Avail: NTIS HC A03/MF A01 CSCL 21/4

Initiation by the U.S. Army Tank-Automotive Command (TACOM) of the Advanced Integrated Propulsion System (AIPS) prompted the development of referee fuels that would: (1) indicate to prospective engine/component developers the anticipated quality of fuels available when AIPS is fielded as part of the next main battle tank, and (2) a means for TACOM to ensure that new engines and components would be able to fully demonstrate a multifuel capability. This study resulted in the development of two referee fuels: (Type 1) a high-volatility, low-viscosity fuel; and Type 2) a low-volatility, high viscosity fuel, both having low cetane numbers. Future multifuel engine design and development work will use these referee fuels to ensure operation on a broad range of fuels that may become available. GRA

N87-15319# Army Armament Research and Development Command, Dover, N. J. Armament Engineering Directorate.
NMR (NUCLEAR MAGNETIC RESONANCE) INVESTIGATIONS OF LIQUID PROPELLANT SYSTEMS CONSISTING OF ALKYL- AND HYDROXYL-AMMONIUM NITRATES. PART 1: CHARACTERIZATION OF CARBON-13, PROTON, AND NITROGEN-15 NMR SPECTRA AND ANALYTICAL APPLICATIONS Final Report
S. Bulusu and R. L. Dudley Sep. 1986 25 p
(AD-A171577; ARAED-TR-86028) Avail: NTIS HC A02/MF A01 CSCL 19/1

The proton, carbon-13, and nitrogen-15 (natural abundance) nuclear magnetic resonance (NMR) spectra of four aliphatic ammonium nitrates (AAN's) which could find application as the fuel components in liquid propellant systems and the nitrogen-15 NMR spectrum of hydroxyl ammonium nitrate (HAN) which serves as the oxidizer heve been characterized in terms of their chemical shifts. The utility of NMR spectroscopy for analytical applications has been evaluated. It was found that while the AAN's can be analyzed by using either proton or carbon-13 NMR, NMR spectroscopy cannot be applied readily to the analysis of HAN. Nitrogen-15 NMR at natural abundance may be applied to analyze HAN, but the technique would be too time-consuming. GRA

29 MATERIALS PROCESSING

Includes space-based development of products and processes for commercial applications.
For biological materials see *55 Space Biology.*

N87-15320*# Wyle Labs., Inc., Huntsville, Ala.
EQUIPMENT CONCEPT DESIGN AND DEVELOPMENT PLANS FOR MICROGRAVITY SCIENCE AND APPLICATIONS RESEARCH ON SPACE STATION: COMBUSTION TUNNEL, LASER DIAGNOSTIC SYSTEM, ADVANCED MODULAR FURNACE, INTEGRATED ELECTRONICS LABORATORY
M. L. Uhran, W. W. Youngblood, T. Georgekutty, M. R. Fiske, and W. O. Wear Sep. 1986 260 p
(Contract NAS3-24654)
(NASA-CR-179535; NAS 1.26:179535) Avail: NTIS HC A12/MF A01 CSCL 22A

Taking advantage of the microgravity environment of space NASA has initiated the preliminary design of a permanently manned space station that will support technological advances in process science and stimulate the development of new and improved materials having applications across the commercial spectrum. Previous studies have been performed to define from the researcher's perspective, the requirements for laboratory equipment to accommodate microgravity experiments on the space station. Functional requirements for the identified experimental apparatus and support equipment were determined. From these hardware requirements, several items were selected for concept designs and subsequent formulation of development plans. This report documents the concept designs and development plans for two items of experiment apparatus - the Combustion Tunnel and the Advanced Modular Furnace, and two items of support equipment the Laser Diagnostic System and the Integrated Electronics Laboratory. For each concept design, key technology developments were identified that are required to enable or enhance the development of the respective hardware. Author

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; cryogenics; and fire prevention.

N87-15321# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
TWO PHASE FLOWS IN MAJOR TECHNOLOGICAL HAZARDS, VOLUME 1
1986 381 p Lecture series held in Rhode-Saint-Genese, Belgium, 24-28 Mar. 1986
(VKI-LS-1986-03-Vol-1; ETN-87-98545) Avail: NTIS HC A17/MF A01

Industrial safety and risk analysis were discussed. Source term; dispersion; combustion; blast; missiles; venting; fire; radiation; runaway reactions; toxic substances; dust explosions; multiphase problems related to safety studies in the process industries; critical flows; and lessons from nuclear engineering safety were considered. For individual titles, see N87-15322 through N87-15326.

N87-15322# Commission of the European Communities, Brussels (Belgium). Directorate-General for Res., Sci. and Educ.
OVERVIEW OF MAJOR HAZARDS RESEARCH. PART 1: OF RISK AND ALL THAT
J. Vilain *In* Von Karman Inst. for Fluid Dynamics Two Phase Flows in Major Technological Hazards, Volume 1 1986 78 p
(For primary document see N87-15321 07-31)
Avail: NTIS HC A17/MF A01

The difficulties in defining hazards and risks due to petrochemical and chemical installations and transport are reviewed. The vagueness of concepts such as safe radius is discussed. ESA

N87-15323# Commission of the European Communities, Brussels (Belgium). Directorate-General for Res., Sci. and Educ.

OVERVIEW OF MAJOR HAZARDS. PART 2: SOURCE TERM; DISPERSION; COMBUSTION; BLAST, MISSILES, VENTING; FIRE; RADIATION; RUNAWAY REACTIONS; TOXIC SUBSTANCES; DUST EXPLOSIONS

J. Vilain *In* Von Karman Inst. for Fluid Dynamics Two Phase Flows in Major Technological Hazards, Volume 1 1986 230 p (For primary document see N87-15321 07-31)
Avail: NTIS HC A17/MF A01

Approaches to major hazard assessment and prediction are reviewed. Source term: (phenomenology/modeling of release, influence on early stages of dispersion); dispersion (atmospheric advection, diffusion and deposition, emphasis on dense/cold gases); combustion (flammable clouds and mists covering flash fires, deflagration, transition to detonation; mostly unconfined/partly confined situations); blast formation, propagation, interaction with structures; catastrophic fires (pool fires, torches and fireballs; highly reactive substances) runaway reactions; features of more general interest; toxic substances, excluding toxicology; and dust explosions (phenomenology and protective measures) are discussed.
ESA

N87-15324# Institut Francais du Petrole, Vernaison. Centre d'Etudes et de Develop. Ind. Solaize.

MULTIPHASE PROBLEMS RELATED TO SAFETY STUDIES IN THE PROCESS INDUSTRIES

R. Grollier Baron *In* Von Karman Inst. for Fluid Dynamics Two-Phase Flows in Major Technological Hazards, Volume 1 1986 12 p (For primary document see N87-15321 07-31)
Avail: NTIS HC A17/MF A01

Safety risk and analysis, particularly in the petrochemical industry, are discussed. Multiphase flow problems resulting from loss of confinement are described: rupture of long pipes used for transporting liquefied gas; rupture of short pipes and branch connections in an installation; rupture of a container holding liquefied gas or another liquid at a temperature higher than its normal boiling temperature; and rupture of a container holding gas in the supercritical state. Operation of valves and rupture disks during reaction runaway; and artificial dispersion of gas layers are considered.
ESA

N87-15325# Universite Catholique de Louvain (Belgium). Dept. de Thermodynamique et Turbomachines.

CRITICAL FLOWS **c34**

Michel Giot *In* Von Karman Inst. for Fluid Dynamics Two Phase Flows in Major Technological Hazards, Volume 1 1986 31 p (For primary document see N87-15321 07-31)
Avail: NTIS HC A17/MF A01

Models of critical flow in pipes are reviewed. The single phase flow; balance equations for two phase flows; two component critical flows; and one component critical flows are considered. Lackme's (1979, 80) model of critical flow of flashing liquids is introduced.
ESA

N87-15326# Universite Catholique de Louvain (Belgium). Dept. de Thermodynamique et Turbomachines.

WHAT CAN WE LEARN FROM NUCLEAR ENGINEERING SAFETY? **c73**

Michel Giot *In* Von Karman Inst. for Fluid Dynamics Two Phase Flows in Major Technological Hazards, Volume 1 1986 20 p (For primary document see N87-15321 07-31)
Avail: NTIS HC A17/MF A01

Nuclear engineering safety studies are reviewed. A large part of the research is useful also for other engineering fields: for example nucleation, critical flow, flow pattern, freezing. Unsolved problems are linked to basic understanding of interfacial transfer phenomena, turbule ɜ, and surface chemistry, for example critical flow, flow pattern, nucleation superheat. The development of large systems codes is not optimized, since exercises show that the increase in prediction accuracy is small with respect to the increase in complexity.
ESA

N87-15327*# National Aeronautics and Space Administration. Pasadena Office, Calif.

HIGH INTENSITY CASTING SYSTEM Patent Application

Earl R. Collins, Jr., inventor (to NASA) Filed 21 Oct. 1986 11 p (Contract NAS7-918)
(NASA-Case-NPO-16901-1-CU; NAS 1.71:NPO-16901-1-CU; US-Patent-Appl-SN-921574) Avail: NTIS HC A02/MF A01 CSCL 13H

A system is provided for casting thin sheets (or tapes) of particles bound together, that are used for oxygen membranes and other applications, which enables the particles to be cast at a high packing density in a tape of uniform thickness. A slurry contains the particles, a binder, and a solvent, and is cast against the inside walls of a rotating chamber. Prior to spraying the slurry against the chamber walls, a solvent is applied to a container. The solvent evaporates to saturate the chamber with solvent vapor. Only then is the slurry cast. As a result, the slurry remains fluid long enough to spread evenly over the casting surface formed by the chamber, and for the slurry particles to become densely packed. Only then is the chamber vented to remove solvent, so the slurry can dry. The major novel feature is applying solvent vapor to a rotating chamber before casting slurry against the chamber walls.
NASA

N87-15328# EIC, Inc., Norwood, Mass.

AN INVESTIGATION OF THE ELECTRODE KINETICS AND ELECTROCHEMISTRY OF REFRACTORY METAL DEPOSITION Final Report, 26 Apr. 1982 - 30 Jun. 1985

Sydney H. White and Urszula M. Twardoch Jul. 1986 169 p (Contract DAAG29-82-C-0015)
(AD-A171410; C-674(F); ARO-19554.3-MS-S) Avail: NTIS HC A08/MF A01 CSCL 13/8

Electrochemical methods represent important ways in which the refractory metal coatings can be applied to the more active metals and alloys to take advantage, at the new surface, of their superior properties to provide erosion and corrosion protection. Currently, of the refractory metals, only chromium can be plated from aqueous solution, albeit in a form that is not entirely free of cracks and pores. These aberrations in the coating can lead to protection failure under severe conditions. The remaining metals can be plated from molten fluoride electrolytes at temperatures in excess of 700 C. It is clear that less severe operating conditions are required for the plating of these metals, to take advantage of their properties in coatings upon as wide a range of materials as possible. The plating process involves the transport of ionic species, established in an ionic medium, to the solution electrode interface at which these species undergo electron transfer reactions and ligand removal to form metal atoms at favored sites. The aggregation of these atoms into clusters of nuclei, their growth into crystallites, and the accumulation of crystallites into a coherent polycrystalline metal coating, represents the final stages of the complex process of metal plating.
GRA

N87-15757# Osaka Univ. (Japan). Dept. of Applied Physics.

APPLICATION OF BARLOW-WU SYSTEMS TO SAFETY MONITORING SYSTEMS

Hiroyuki Hagihara, Makoto Sakurai, Fumio Ohi, and Toshio Nishida *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 245-248 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

32 COMMUNICATIONS AND RADAR

Includes radar; land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Space Communications, Spacecraft Communications, Command and Tracking.* For search and rescue see *03 Air Transportation and Safety,* and *16 Space Transportation.*

N87-15329*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

THE TELECOMMUNICATIONS AND DATA ACQUISITION REPORT Progress Report, Jul. - Sep. 1986
E. C. Posner, ed. 15 Nov. 1986 313 p
(NASA-CR-179938; JPL-TDA-PR-42-87; NAS 1.26:179938) Avail: NTIS HC A14/MF A01 CSCL 17B

This quarterly publication (July-Sept. 1986) provides archival reports on developments in programs managed by JPL's Office of Telecommunications and Data Acquisition (TDA). In space communications, radio navigation, radio science, and ground-based radio astronomy, it reports on activities of the Deep Space Network (DSN) and its associated Ground Communications Facility (GCF) in planning, in supporting research and technology, in implementation, and in operations. This work is performed for NASA's Office of Space Tracking and Data Systems (OSTDS). In geodynamics, the publication reports on the application of radio interferometry at microwave frequencies for geodynamic measurements. In the search for extraterrestrial intelligence (SETI), it reports on implementation and operations for searching the microwave spectrum. The latter two programs are performed for NASA's Office of Space Science and Applications (OSSA). For individual titles, see N87-15330 through N87-15360.

N87-15330*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
REFERENCE FREQUENCY TRANSMISSION OVER OPTICAL FIBER
G. Lutes and A. Kirk *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 1-9 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 17B

A 100-MHz reference frequency from a hydrogen maser frequency standard has been transmitted via optical fiber over a 14-km distance with a measured stability of 1.5 X 10 to the-15 power for 1000 seconds averaging time. This capability was demonstrated in a frequency distribution experiment performed in April, 1986. The reference frequency was transmitted over a single-mode fiber-optic link from Deep Space Station (DSS) 13 to DSS 12 and back. The background leading up to the experiment and the significance of stable reference frequency distribution in the Deep Space Network (DSN) is discussed. Also described are the experiment, including the fiber-optic link, the measurement method and equipment, and finally the results of the experiment. Author

N87-15331*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DESIGN CONSIDERATIONS FOR THE BEAM-WAVEGUIDE RETROFIT OF A GROUND ANTENNA STATION
T. Veruttipong, J. Withington, V. Galindo-Israel, W. Imbriale, and D. Bathker *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 10-23 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 17B

Retrofitting an antenna that was originally designed without a beam waveguide introduces special difficulties because it is desirable to minimize alteration of the original mechanical truss work and to image the actual feed without distortion at the focal point of the dual-shaped reflector. To obtain an acceptable image, certain Geometrical Optics (GO) design criteria are followed as closely as possible. The problems associated with applying these design criteria to a 34-meter dual-shaped DSN (Deep Space Network) antenna are discussed. The use of various diffraction analysis techniques in the design process is also discussed. GTD and FFT algorithms are particularly necessary at the higher frequencies, while Physical Optics and Spherical Wave Expansions proved necessary at the lower frequencies. Author

N87-15332*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A SYNCHRONIZATION TECHNIQUE FOR OPTICAL PPM SIGNALS
V. A. Vilnrotter, E. R. Rodemich, and H. H. Tan *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 24-31 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 17B

A technique for maintaining synchronization between optical PPM (pulse-position modulation) pulses and a receiver clock by means of a delay-tracking loop is described and analyzed. The tracking loop is driven by a doubly stochastic Poisson process that contains information about the location of the desired slot boundaries. The slot boundaries are subject to slowly varying random delays that are ultimately tracked by the loop. The concept of fractional rms delay error is introduced to quantify the effects of signal and background induced shot noise on the performance of the delay-tracking loop. Author

N87-15333*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
RECEIVED OPTICAL POWER CALCULATIONS FOR OPTICAL COMMUNICATIONS LINK PERFORMANCE ANALYSIS
W. K. Marshall and B. D. Burk *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 32-40 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 17B

The factors affecting optical communication link performance differ substantially from those at microwave frequencies, due to the drastically differing technologies, modulation formats, and effects of quantum noise in optical communications. In addition detailed design control table calculations for optical systems are less well developed than corresponding microwave system techniques, reflecting the relatively less mature state of development of optical communications. Described below are detailed calculations of received optical signal and background power in optical communication systems, with emphasis on analytic models for accurately predicting transmitter and receiver system losses. Author

N87-15334*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A COOLED AVALANCHE PHOTODIODE WITH HIGH PHOTON DETECTION PROBABILITY
D. L. Robinson and B. D. Metscher *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 41-47 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 17B

An avalanche photodiode has been operated as a photon-counting detector with 2 to 3 times the sensitivity of currently-available photomultiplier tubes. APD (avalanche photodiodes) detection probabilities that exceed 27% and approach 50% have been measured at an optimum operating temperature which minimizes noise. The sources of noise and their dependence on operating temperature and bias voltage are discussed. Author

N87-15335*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
FRAUNHOFER FILTERS TO REDUCE SOLAR BACKGROUND FOR OPTICAL COMMUNICATIONS
E. L. Kerr *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 48-55 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 17B

A wavelength that lies within a spectral interval of reduced solar emission (a Fraunhofer line) can carry optical communications with reduced interference from direct or reflected background sunlight. Suitable Fraunhofer lines are located within the tuning range of good candidate lasers. The laser should be tunable dynamically to track Doppler shifts in the sunlight incident on any solar system body that may appear in the background as viewed by the receiver. A Fraunhofer filter used with a direct-detection receiver should be tuned to match the Doppler shifts of the source and background. The required tuning calculated here for various situations is also required if, instead, one uses a heterodyne receiver with limited post-detection bandwidth. Author

N87-15336*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

A COST-PERFORMANCE MODEL FOR GROUND-BASED OPTICAL COMMUNICATIONS RECEIVING TELESCOPES

J. R. Lesh and D. L. Robinson *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 56-64 (For primary document see N87-15329 07-32)

Avail: NTIS HC A14/MF A01 CSCL 17B

An analytical cost-performance model for a ground-based optical communications receiving telescope is presented. The model considers costs of existing telescopes as a function of diameter and field of view. This, coupled with communication performance as a function of receiver diameter and field of view, yields the appropriate telescope cost versus communication performance curve. Author

N87-15337*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

RELATIVE PERFORMANCE OF 8.5-GHz AND 32-GHz TELEMETRY LINKS ON THE BASIS OF TOTAL DATA RETURN PER PASS c17

M. A. Koerner *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 65-80 (For primary document see N87-15329 07-32)

Avail: NTIS HC A14/MF A01 CSCL 09F

The performance of X-band (8.5-GHz) and 32-GHz telemetry links is compared on the basis of the total data return per DSN station pass. Differences in spacecraft transmitter efficiency, transmit circuit loss, and transmitting antenna area efficiency and pointing loss are not considered in these calculations. Thus, the performance differentials calculated in this memo are those produced by a DSN 70-m station antenna gain and clear weather receiving system noise temperature and by weather. These calculations show that, assuming mechanical compensation of the DSN 70-m antenna for 32-GHz operation, a performance advantage for 32 GHz over X-band of 8.2 dB can be achieved for at least one DSN station location. Even if only Canberra and Madrid are used, a performance advantage of 7.7 dB can be obtained for at least one DSN station location. A system using a multiple beam feed (electronic compensation) should achieve similar results. Author

N87-15338*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

LONG-TERM AMPLITUDE AND PHASE STABILITY OF THE 400-kW 2.115-GHz TRANSMITTER

D. J. Hoppe and A. M. Bhanji *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 81-91 (For primary document see N87-15329 07-32)

Avail: NTIS HC A14/MF A01 CSCL 17B

Results of recent measurements of the long-term phase, amplitude and group delay stability of the 400-kW S-band (2.115-GHz) transmitter are reported. Various control parameters which are responsible for many of the observed instabilities are identified. Further tests to identify the parameters responsible for the remaining instabilities are suggested. Author

N87-15339*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

DSN MICROWAVE ANTENNA HOLOGRAPHY. PART 2: DATA PROCESSING AND DISPLAY OF HIGH-RESOLUTION EFFECTIVE MAPS c35

D. J. Rochblatt, Y. Rahmat-Samii, and J. H. Mumford *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 92-97 (For primary document see N87-15329 07-32)

Avail: NTIS HC A14/MF A01 CSCL 14E

The results of a recently completed computer graphic package for the process and display of holographically recorded data into effective aperture maps are presented. The term effective maps (labelled provisional on the holograms) signifies that the maps include contributions of surface mechanical errors as well as other electromagnetic factors (phase error due to feed/subreflector misalignment, linear phase error contribution due to pointing errors, subreflector flange diffraction effects, and strut diffraction shadows). While these maps do not show the true mechanical surface errors, they nevertheless show the equivalent errors, which are effective in determining overall antenna performance. Final steps to remove electromagnetic pointing and misalignment factors are now in progress. The processing and display of high-resolution effective maps of a 64m antenna (DSS 63) are presented. Author

N87-15340*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

A SINGLE VLSI CHIP FOR COMPUTING SYNDROMES IN THE (225, 223) REED-SOLOMON DECODER c33

I. S. Hsu, T. K. Truong, H. M. Shao, and L. J. Deutsch *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 98-103 (For primary document see N87-15329 07-32)

Avail: NTIS HC A14/MF A01 CSCL 09A

A description of a single VLSI chip for computing syndromes in the (255, 223) Reed-Solomon decoder is presented. The architecture that leads to this single VLSI chip design makes use of the dual basis multiplication algorithm. The same architecture can be applied to design VLSI chips to compute various kinds of number theoretic transforms. Author

N87-15341*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

TABLE LOOK-UP ESTIMATION OF SIGNAL AND NOISE PARAMETERS FROM QUANTIZED OBSERVABLES

V. A. Vilnrotter and E. R. Rodemich *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 104-113 (For primary document see N87-15329 07-32)

Avail: NTIS HC A14/MF A01 CSCL 17B

A table look-up algorithm for estimating underlying signal and noise parameters from quantized observables is examined. A general mathematical model is developed, and a look-up table designed specifically for estimating parameters from four-bit quantized data is described. Estimator performance is evaluated both analytically and by means of numerical simulation, and an example is provided to illustrate the use of the look-up table for estimating signal-to-noise ratios commonly encountered in Voyager-type data. Author

N87-15342*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

A COMPARISON OF METHODS FOR DPLL LOOP FILTER DESIGN c33

S. Aguirre, W. J. Hurd, R. Kumar, and J. Statman *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 114-124 (For primary document see N87-15329 07-32)

Avail: NTIS HC A14/MF A01 CSCL 09A

Four design methodologies for loop filters for a class of digital phase-locked loops (DPLLs) are presented. The first design maps an optimum analog filter into the digital domain; the second approach designs a filter that minimizes in discrete time weighted combination of the variance of the phase error due to noise and the sum square of the deterministic phase error component; the third method uses Kalman filter estimation theory to design a filter composed of a least squares fading memory estimator and a predictor. The last design relies on classical theory, including rules for the design of compensators. Linear analysis is used throughout the article to compare different designs, and includes stability, steady state performance and transient behavior of the loops. Design methodology is not critical when the loop update rate can be made high relative to loop bandwidth, as the performance approaches that of continuous time. For low update rates, however, the miminization method is significantly superior to the other methods. Author

N87-15343*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

A GENERALIZED ALGORITHM TO DESIGN FINITE FIELD NORMAL BASIS MULTIPLIERS c64

C. C. Wang *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 125-139 (For primary document see

N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 12A

Finite field arithmetic logic is central in the implementation of some error-correcting coders and some cryptographic devices. There is a need for good multiplication algorithms which can be easily realized. Massey and Omura recently developed a new multiplication algorithm for finite fields based on a normal basis representation. Using the normal basis representation, the design of the finite field multiplier is simple and regular. The fundamental design of the Massey-Omura multiplier is based on a design of a product function. In this article, a generalized algorithm to locate a normal basis in a field is first presented. Using this normal basis, an algorithm to construct the product function is then developed. This design does not depend on particular characteristics of the generator polynomial of the field. Author

N87-15344*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
X-BAND UPLINK FEEDCONE CAPABILITIES, COMPONENTS, AND LAYOUT
H. Marlin, A. Freiley, and R. Hartop *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 140-147 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 17B

Two new X-(7.2 GHz up, 8.4 GHz down) and S-band (2.1 to 2.3 Ghz) common aperture (XSC) feedcones are being added to the DSS 45 and DSS 65 34-Meter Efficiency Antennas. These new feedcones are modifications of the existing SXC feedcone design incorporating a new high power (20-kW) X-band transmitter. The modified Antenna Microwave Subsystem design also incorporates two additional X-band low noise amplifiers and greater phase stability performance to meet both the increased stability requirements for Galileo gravity wave experiments and requirements for spacecraft navigation near the Sun. A third XSC will be constructed for DSS 15 later. Author

N87-15345*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A NEW ALGORITHM FOR MICROWAVE DELAY ESTIMATION FROM WATER VAPOR RADIOMETER DATA
S. E. Robinson *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 149-164 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 17B

A new algorithm has been developed for the estimation of tropospheric microwave path delays from water vapor radiometer (WVR) data, which does not require site and weather dependent empirical parameters to produce high accuracy. Instead of taking the conventional linear approach, the new algorithm first uses the observables with an emission model to determine an approximate form of the vertical water vapor distribution which is then explicitly integrated to estimate wet path delays, in a second step. The intrinsic accuracy of this algorithm has been examined for two channel WVR data using path delays and stimulated observables computed from archived radiosonde data. It is found that annual RMS errors for a wide range of sites are in the range from 1.3 mm to 2.3 mm, in the absence of clouds. This is comparable to the best overall accuracy obtainable from conventional linear algorithms, which must be tailored to site and weather conditions using large radiosonde data bases. The new algorithm's accuracy and flexibility are indications that it may be a good candidate for almost all WVR data interpretation. Author

N87-15346*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
BLOCK 2A TRAVELING-WAVE MASER c36
D. L. Trowbridge *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 158-164 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 20E

Two 8.4GHz low-noise traveling-wave masers (TWMS) with effective input noise temperatures of 3.6 to 3.9 K and bandwidth in excess of 100 MHz have been supplied to the Deep Space Network. These TWMs are used on the 64-meter antennas at Deep Space Stations 14 and 43 to meet the requirements of the Voyager Uranus encounter. The TWMs have improved isolator assemblies and new interstage matching configurations to reduce gain/bandwidth ripple. They are equipped with followup Field Effect Transistor Amplifiers as part of the design to meet the 100-MHz bandwidth requirements of very long baseline interferometry. Author

N87-15347*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ANTENNA SERVO CONTROL SYSTEM CHARACTERIZATION: RATE LOOP ANALYSIS FOR 34-m ANTENNA AT DSS 15 c37
J. A. Nickerson, D. G. Cox, H. K. Smith, J. H. Engel, and H. G. Ahlstrom *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 165-173 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 13I

The elevation and azimuth servo rate loops at the 34-m High Efficiency Deep Space Station 15 (DSS 15) are described. Time and frequency response performance criteria were measured. The results are compared to theoretically deduced performance criteria. Unexpected anomalies in the frequency response are observed and identified. Author

N87-15348*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SOFTWARE DEVELOPMENT FOR THE VLA-GDSCC TELEMETRY ARRAY PROJECT c17
H. W. Cooper and L. R. Hileman *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 174-178 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 09F

Software for the VLA-GDSCC Telemetry Array (VGTA) Project is being developed in a new manner. Within the Radio Frequency and Microwave Subsystems Section, most microprocessor software has been developed using Intel hardware and software development systems. The VGTA software, however, is being developed using IBM PCs running consumer-oriented software. Utility software and procedures have been generated which allow the software developed on the IBM PCs to be transferred and run on a multibus 8086 computer. Author

N87-15349*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
REAL-TIME COMBINER LOSS c17
M. K. Simon and A. Mileant *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 179-184 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 09F

Telemetry signals from several channels are aligned in time and combined by the Real-Time Combiner (RTC) in order to increase the strength of the total signal. In this article, the impact of the timing jitter in the RTC on the bit/symbol error rate is investigated. Equations are derived for the timing jitter loss associated with the coded and uncoded channels. Included are curves that depict the bit-symbol error rate vs. E sub b/N sub 0 and E sub s/N sub 0 for some typical telemetry conditions. The losses are typically below 0.1 dB. Author

N87-15350*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PPM/NAR 8.4-GHz NOISE TEMPERATURE STATISTICS FOR DSN 64-METER ANTENNAS, 1982-1984
S. D. Slobin and E. M. Andres *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 185-192 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 17B

From August 1982 through November 1984, X-band downlink (8.4-GHz) system noise temperature measurements were made on the DSN 64-m antennas during tracking periods. Statistics of these noise temperature values are needed by the DSN and by spacecraft mission planners to assess antenna, receiving, and

telemetry system needs, present performance, and future performance. These measurements were made using the DSN Mark III precision power monitor noise-adding radiometers located at each station. It is found that for DSS 43 and DSS 63, at the 90% cumulative distribution level, equivalent zenith noise temperature values fall between those presented in the earlier (1977) and present (1983) versions of DSN/Flight Project design documents. Noise temperatures measured for DSS 14 (Goldstone) are higher than those given in existing design documents and this disagreement will be investigated as a diagnostic of possible PPM or receiving system performance problems. Author

N87-15351*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
RIVITED PANEL SURFACE MEASUREMENT USING PHOTOGRAMMETRY c43
W. D. Merrick, V. B. Lobb, F. L. Lansing, and F. W. Stoller *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 193-205 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 14E

Two riveted antenna panels on rings number 3 and 9 were removed from the 34m antenna at DSS-15, fixed in the leveled position and the surface was photographed indoors. The results from this pilot photogrammetric demonstration and diagnostics of panel surface contours, are presented. The photogrammetric network for each panel incorporated eight photographs, two from each of four camera stations and observed over 200 targets. The accuracy (1 sigma) of the XYZ coordinates for the error ellipsoids was + or - 0.013 mm (0.0005 inch). This level of precision relative to the object size corresponds roughly to 1 part in 250,000 which is superior to conventional dial sweep-arm template techniques by at least a factor of 4. Author

N87-15352*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
POINTING CALIBRATION OF THE MKIVA DSN ANTENNAS VOYAGER 2 URANUS ENCOUNTER OPERATIONS SUPPORT
R. Stevens, R. L. Riggs, and B. Wood *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 206-239 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 17B

The MKIVA DSN introduced significant changes to the pointing systems of the 34-meter and 64-meter diameter antennas. To support the Voyager 2 Uranus Encounter, the systems had to be accurately calibrated. Reliable techniques for use of the calibrations during intense mission support activity had to be provided. This article describes the techniques used to make the antenna pointing calibrations and to demonstrate their operational use. The results of the calibrations are summarized. Author

N87-15353*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
GIOTTO MISSION SUPPORT c12
C. Stelzried and T. Howe *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 243-248 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 22A

Deep Space Network (DSN) support of the Giotto mission to Comet Halley is summarized. The support is described beginning with the preiaunch testing and continues through the post comet encounter period. Author

N87-15354*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
GIOTTO NAVIGATION SUPPORT c12
N. A. Mottinger and R. I. Premkumar *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 249-262 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 22A

Cooperative efforts between NASA and the European Space Agency (ESA) in supporting the flight of Giotto to Halley's Comet included prelaunch checks of ESA navigation software and delivery of validated DSN radio metric tracking data during the mission. Effects of drag from passing through the coma are seen in data received pre and post encounter. The post encounter Giotto trajectory provides a solar occultation in January 1988, prior to returning to the Earth in 1990 for possible retargeting to yet another comet. Author

N87-15355*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PATHFINDER OPERATIONS c12
J. Wilcher, C. Stelzried, and S. Finley *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 263-267 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 22A

In 1981, the Inter-Agency Consultative Group (composed of European, Soviet, Japanese and American space agency representatives) conceived the idea of using the two Soviet Vega spacecraft as pathfinders for Giotto since they would arrive at Halley's Comet approximately one week before Giotto. The Vega trajectory data and the Halley camera angle data were combined to improve the comet orbit accuracy. This was used to improve the Giotto fly-by targeting. The DSN performed delta DOR (VLBI) and one-way Doppler measurements of the Vega spacecraft for orbit determination. Although the early part-up phase had many problems, the results during the critical November 30, 1985 to March 4, 1986 operational phase had an overall 95 percent success rate, with 59 successes out of 62 two-station passes. Author

N87-15356*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
VEGA PATHFINDER NAVIGATION FOR GIOTTO HALLEY ENCOUNTER c12
J. Ellis and T. P. McElrath *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 268-278 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 22A

Results of the VEGA Pathfinder concept which was used to successfully target the European Space Agnecy's Giotto spacecraft to a 600 km encounter with the comet Halley are presented. Pathfinder was an international cooperative navigation activity involving USSR, European and U.S. space agencies. The final Giotto targeting maneuver was based on a comet location determined from optical data acquired by the earlier arriving Soviet VEGA spacecraft. Inertial pointing angles extracted from optical images of the comet nucleus wsre combined with a precise estimate of the VEGA encounter orbits determined using VLBI data acquired by NASA's Deep Space Network to predict the location of Halley at Giotto encounter. This article describes the VLBI techniques used to determine the VEGA orbits and shows that the insensitivity of the VLBI data strategy to unmodeled dynamic error sources resulted in estimates of the VEGA orbits with an accuracy of 50 km. Author

N87-15357*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SELECTION OF RADIO SOURCES FOR VENUS BALLOON-PATHFINDER DELTA-DOR NAVIGATION AT 1.7 GHz
K. M Liewer *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 279-284 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 17B

In order to increase the success rate of the Delta-DOR (Delta-Differential One-way Range) VLBI navigational support for the French-Soviet Venus Balloon and Halley Pathfinder projects, forty-four extragalactic radio sources were observed in advance of these projects to determine which were suitable for use as reference sources. Of these forty-four radio sources taken from the existing JPL radio source catalogue, thirty-six were determined to be of sufficient strength for use in Delta-DOR VLBI navigation. Author

N87-15358*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ICE SECOND HALLEY RADIAL: TDA MISSION SUPPORT AND

DSN OPERATIONS c12
N. A. Fanelli, L. Efron, and R. J. Muellerschoen *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 285-290 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 22A

The article documents the operations encompassing the International Cometary Explorer (ICE) second Halley radial experiment centered around March 28, 1986. The support was provided by the Deep Space Network (DSN) 64-meter subnetwork. Near continuous support was provided the last two weeks of March and the first two weeks of April to insure the collection of adequate background data for the Halley radial experiment. During the last week of March, plasma wave measurements indicate that ICE was within the Halley heavy ion pick-up region. Author

N87-15359*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PROPAGATION THROUGH MARTIAN DUST AT 8.5 AND 32 GHz
E. K. Smith and W. L. Flock *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 291-299 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 17B

Independent studies of attenuation of X-band (8.5 GHz) and Ka-band (32 Ghz) radio signals when traversing Martian dust were carried out. These analyses turned out remarkably similar. The computational method is essentially that of T. S. Chu but uses observed optical depth at 0.67 microns rather than visibility as the measure of optical attenuation from which to derive the microwave attenuation. An awkwardness in the approach is that the size distribution of Martian dust particles is not well known, but the mean is probably around 4 microns, whereas in the terrestrial case it is nearer 10 microns. As a consequence, there will be a larger tail of particles still in the Mié regime in the Martian case as compared to the terrestrial one. The computational error will, therefore, be somewhat larger for Martian than Earth-bound dust. Fortunately, the indicated attenuations are small enough for the worst case (1.3 dB at 32 GHz) that the error is academic. Author

N87-15360*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SYSTOLIC VLSI FOR KALMAN FILTERS c33
H.-G. Yeh and J. J. Chang *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 300-306 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 09A

A novel two-dimensional parallel computing method for real-time Kalman filtering is presented. The mathematical formulation of a Kalman filter algorithm is rearranged to be the type of Faddeev algorithm for generalizing signal processing. The data flow mapping from the Faddeev algorithm to a two-dimensional concurrent computing structure is developed. The architecture of the resulting processor cells is regular, simple, expandable, and therefore naturally suitable for VLSI chip implementation. The computing methodology and the two-dimensional systolic arrays are useful for Kalman filter applications as well as other matrix/vector based algebraic computations. Author

N87-15361# European Space Agency, Paris (France).
PROCEEDINGS OF AN ESA WORKSHOP ON LAND MOBILE SERVICES BY SATELLITE
T. D. Guyenne, comp. and J. Hunt, comp. Sep. 1986 153 p Partly in ENGLISH and FRENCH Workshop held in Noordwijk, Netherlands, 3-4 Jun. 1986
(ESA-SP-259; ISSN-079-6566; ETN-87-98894) Avail: NTIS HC A08/MF A01

Land mobile satellite service applications and markets; space and terminal technology; frequency assignment and regulatory aspects; and pilot system implementation were discussed. For individual titles, see N87-15362 through N87-15389.

N87-15362# Satel Conseil, Paris (France).
LAND MOBILE COMMUNICATIONS SATELLITE MISSIONS IN EUROPE
R. deVerdiere *In* ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 3-5 (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

A market survey of the potential needs for land mobile communications in Europe in 1995 and 2005 was carried out. There is an exploding demand for land mobile communications in Europe. This demand justifies that every effort be made to develop as fast as possible a compatible pan-European terrestrial mobile system. The potential remaining needs, outside of the presently planned terrestrial mobile system, which can be served only by satellite, could exceed the capacity of a single medium size communications satellite in the available state of the art technology. ESA

N87-15363# Italspazio, Rome (Italy).
LAND MOBILE COMMUNICATIONS SATELLITE
C. Carnebianca, B. Pavesi, and A. Tuozzi *In* ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 7-12 (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

The economic value and salient technical and operational characteristics of a European Land Mobile Communication Satellite (LMCS) to complement and supplement the demand for mobile services of Western European countries in the 1995 to 2005 time frames were assessed. A significant future expansion of demand for LCMS services on the part of the public is anticipated. Important augmentations of current service capabilities could be achieved by a satellite service, improving the overall system performances and/or assisting the PTT's in containing their investments in the required infrastructure. The satellite service itself could represent a profitable revenue producer. ESA

N87-15364# Mobile Satellite Corp., King of Prussia, Pa.
MOBILE AVIATION SERVICES IN THE 1545-1559/1646.5-1660.5 MHz BAND
J. D. Kiesling *In* ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 13-15 (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

Plans in the U.S. for a national mobile satellite service (MSS) including satellite services to aviation for air traffic control and airline operational control are outlined. The MSS provides affordable mobile services in nonurban areas where terrestrially based systems are uneconomic. The MSS system also is available on a priority basis for aviation services, specifically AMSS(R) services involving safety and regularity of flight and other aviation services. The U.S. plan is expected to change the U.S. Tables of Allocations and proposes to change the International Table of Allocations so that MSS facilities can and will provide AMSS(R) services on a priority basis. Such arrangements can be implemented worldwide by administrations and organizations having similar interests. ESA

N87-15365# International Maritime Satellite Organization, London (England).
ECONOMIC AND MARKET ASPECTS OF LAND MOBILE SATELLITE COMPARED TO TERRESTRIAL CELLULAR RADIO
In ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 17-18 (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

Cellular radio and INMARSAT Standard-C technologies for thin route mobile communications in the immediate future are compared. It is suggested that while the cellular radio systems are in operation or are planned for introduction in the immediate future in most Western European nations, coverage gaps are likely to persist due to economic, technical, and institutional reasons. A satellite system, with its inherent qualities, can fill the gap by providing a thin-route coverage in Europe, Middle East, and Africa. However, when subscriber densities increase to the point that

cellular radio service becomes feasible in previously uneconomical regions, satellite service becomes less attractive, and may be eventually displaced. Where only alphanumeric two-way messaging is required, INMARSAT Standard-C can provide thin route data messaging service to users with wide-area, long-distance, or transborder communications requirements. ESA

N87-15366# Maschinenfabrik Augsburg-Nuernberg A.G., Munich (West Germany).
COMMUNICATION BY SATELLITES FOR TRUCK SYSTEMS
P. Meinke *In* ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 19-22 (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

Computer and telephone systems used by truckers to communicate with their base are described. Introduction of a satellite into the system is suggested. ESA

N87-15367# Philips Telecommunications and Information Systems, The Hague (Netherlands).
VECOM: A POWERFUL LOCAL COMMUNICATION CHANNEL BETWEEN VEHICLE-BORNE AND ROADSIDE SYSTEMS
W. Ros *In* ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 23-25 (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

A system which provides for an inductive data transmission channel for local communication is described. Data exchange takes place at strategic spots via communication loops, embedded in the road. Though the main applications of the system are in the field of public transit, in other fields of transportation the system might offer interesting possibilities, especially when combined with a long range data communication system. ESA

N87-15368# Netherlands Inst. of Transport, Rijswijk.
ECONOMIC ASPECTS OF COMMUNICATION IN ROAD TRANSPORT
J. H. P. vanRens *In* ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 27-31 (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

Availability of adequate communication systems for control and management in the road transport sector where a large part of the transport service is produced beyond the physical control of the company is discussed. The fact that the transport service has to be produced and consumed simultaneously makes the optimal use of the production capacity more critical. Developments in the organization of logistical concepts will put more emphasis on the need of communications, which inevitably will lead to the application of communication systems between office and vehicle. ESA

N87-15369# MATRA Espace, Paris-Velizy (France).
DATA TRANSMISSION: A KEY FACTOR TO THE EFFICIENCY OF THE TRANSPORT INDUSTRY
N. Soulie *In* ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 33-34 (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

Criteria to define data transmission services in land mobile systems are suggested. Potential users in passenger transportation by road, freight transportation by road, rail traffic, security services and utilities, and others, such as car hire companies, are identified. The advantages and disadvantages of wide area paging, CB, private mobile radio, and cellular radio are listed. ESA

N87-15370# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
LAND MOBILE SATELLITE COMMUNICATIONS: CHANNEL MODEL, MODULATION, AND ERROR CONTROL
E. Lutz, W. Papke, and E. Ploechinger *In* ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 37-42 (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

A land mobile satellite channel was recorded and subjected to statistical evaluation. Results for different environments and antennas are given. An analytical channel model is derived, and its parameters are determined. The bit error rate of uncoded and FEC-coded transmission is evaluated. Digital speech communication with small land mobile terminals seems to be limited to areas with infrequent shadowing. Data transmission with automatic repeat request is investigated by software simulation. The results show that a reliable telegraphy service can be established in open areas and in cities. ESA

N87-15371# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Mathematical Support Div.
PRODAT SYSTEM ARCHITECTURE
E. Kristiansen *In* ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 43-46 (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

The PRODAT experimental satellite-based mobile communication system is presented. The goal of PRODAT is to provide low rate data communication between mobile terminals on land mobiles, small ships, and aircraft and fixed users connected to a ground station via terrestrial networks. Primary design objectives are that the mobile terminals must be compact, have low power consumption, and the mass production cost must be low. In particular, the antenna design must be such that the antennas are easily installed and do not cause unacceptable air drag. The PRODAT uses MARECS-B2, located in geostationary orbit over the Atlantic Ocean and operated by INMARSAT. ESA

N87-15372# International Maritime Satellite Organization, London (England).
THE INMARSAT STANDARD-C SERVICE
In ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 47-49 (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

A low speed data service for message based communications to small, mobile terminals is presented. The system is configured to provide the user with a cost effective way of sending and receiving messages through either private or public terrestrial communications networks. Store and forward techniques are used at the Earth station providing connection between the INMARSAT satellite network and the terrestrial networks. This approach allows efficient message transfer and provides flexibility for a variety of service interfaces. The user terminal is configured for simple operation, and use of computer-related technology maximizes the facilities available while keeping costs down. ESA

N87-15373# Instituto de Electronica de Communicaciones, Madrid (Spain).
LOW GAIN ANTENNAS FOR LAND-MOBILE TERMINALS
J. Barbero, J. L. Fontecha, A. Gonzalez, C. Martin-Pascual, J. Vassallo, and M. L. Hernanz *In* ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 51-56 (For primary document see N87-15361 07-32)
(Contracts ESTEC-5324/82; ESTEC-6101/84; ESTEC-6372/85)
Avail: NTIS HC A08/MF A01

Satellite reception antennas were developed for trucks and cars. They are made of quadrifilar helices with dielectric core; the truck one (3 lambda/4) includes a balun inside the core and a small ground plane for beam shaping; the car one (lambda/2) is provided with a NACA profiled radome to optimize the induced drag. Truck antennas with gain greater than 5 dBi by means of switched beams are presented. A pyramidal array of circular microstrip patches and a planar arrangement of four patches in different modes and frequencies, and two other designs with patches are also treated. ESA

N87-15374# Fabrica Italiana Apparecchi Radio S.p.A., Milan. Space Dept.
IMPLEMENTATION OF A LAND MOBILE TERMINAL FOR

SATELLITE DATA COMMUNICATION
G. B. Valsasina *In* ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 57-60 (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

A prototype for a Land Mobile Terminal (LMT) to perform in-field experimentation and validation activities on the mobile - satellite - shore station link, and to confirm the validity of the proposed LMT implementation was developed for PRODAT. The PRODAT LMT will be a two way system for demonstrating a data only communication at low data rate between land mobile users and a network managing system using the MARECS-A satellite and future dedicated satellites. The terminal consists of the antenna, plus an RF box, below roof equipment, and user interface. ESA

N87-15375# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Radio Frequency System Div.
ADVANCED REGIONAL MOBILE SATELLITE SYSTEM FOR THE NINETIES
W. Kriedte and A. Vernucci (Telespazio, S.p.A., Rome, Italy) *In* ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 61-66 (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

A land mobile satellite service using a multibeam phased array antenna with 19 spot beams and regenerative transponders in the forward and return link to serve up to 4000 telephony connections with small mobile terminals of up to 10 W RF transmit power is introduced. Critical subsystems such as the deployable antenna, reconfigurable regenerative transponder, a robust adaptive thermal control system, on-board processing for packet-based services, and, possibly, the implementation of an on-board network control station require attention. The precise identification of the satellite system role in the overall land-mobile network and of the services to be provided; propagation characteristics, and coding/automatic repeat request techniques are also very important. ESA

N87-15376# Racal-Decca Advanced Development Ltd., Walton-on-Thames (England).
ON-BOARD PROCESSING PAYLOAD TECHNOLOGY FOR AN EUROPEAN LAND MOBILE SATELLITE SYSTEM c60
I. E. Casewell *In* ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 67-74 Sponsored by ESA (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

The application of satellite on-board processing (OBP) technology for land mobile applications for possible introduction in the late 1990s is considered. A system outline is presented and the merits of OBP over conventional transparent payloads are discussed. System definition, digital signal processing technology, OBP architecture, and an ESA OBP payload are treated. Power, mass and volume estimates are presented. ESA

N87-15377# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
L-BAND ANTENNAS FOR REGIONAL MOBILE COMMUNICATION SATELLITES
A. Roederer *In* ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 75-80 (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

Satellite L-band antennas ranging for state of the art small reflector systems to multibeam arrays, to large array-fed reflectors, with frequency reuse, flexible channel to beam allocation and/or steerable beam capabilities over an extended European coverage are reviewed. Both 2.5 to 5 m multifeed reflectors and foldable multibeam arrays are valid candidates for regional mobile communication satellites in the next decade. The foldable multibeam arrays have the major advantage over the multifeed reflectors of quasi-total traffic to beam allocation flexibility. In the longer term, when increase in traffic is such that on board minimum gains greater than 35 dBi are required, unfurlable reflectors with diameters greater than 10 m are preferable, since direct radiating arrays with equivalent aperture area cannot easily be deployed. Technologies for foldable arrays and reflectors up to 5 m diameter should be available for flight in the early nineties from present hardware developments. The same technology is applicable up to greater than 10 m, but with a serious additional effort required, particularly in testing. ESA

N87-15378# Department of Communications, Ottawa (Ontario). Communications Research Center.
MODULATION AND VOICE CODING FOR MOBILE SATELLITE APPLICATIONS
R. W. Huck *In* ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 81-86 (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

Voice codecs and narrowband modulation schemes which permit use of satellite SCPC channel spacing as low as 5 kHz and satellite power reduced by several dB over more conventional modulation schemes are discussed. A 2.4 kbps pitch excited linear predictive vocoder is described, along with a differential minimum shift keyed modem and an amplitude companded single sideband modem. Each of these items is implemented in software using a single microprocessor, thereby minimizing hardware costs. ESA

N87-15379# Perisud, Montrouge (France).
LAND MOBILE SATELLITE SERVICE: REGULATORY ASPECTS [SERVICE MOBILE TERRESTRE PAR - SATELLITE ASPECTS REGLEMENTAIRES]
J. L. Blanc *In* ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 89-92 In FRENCH (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

International cooperation in frequency assignment for land mobile satellite services is discussed. It is stressed that the MOB-87 conference is the last chance to modify the assignments before the end of the century. ESA

N87-15380# Department of Trade and Industry, Stevenage (England). Radio Regulatory Div.
FREQUENCY SPECTRUM ALLOCATION FOR A POTENTIAL LAND MOBILE-SATELLITE SERVICE
D. P. Willmets *In* ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 93-94 (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

Frequency spectrum allocation for a potential land mobile satellite service is discussed. There are no suitable primary or secondary allocations but the agenda for WARC(MOBILE)87 permits amendments to the International Table of Frequency Allocations. It is argued that it is necessary to identify the answers to key questions such as the likely demand, user needs, and spectrum requirements. Until the aeronautical mobile satellite (R) bands at 1.5/1.6 GHz are required, land mobile satellite systems could possibly operate. However, systems would not be able to operate in these bands (or any possible alternative frequency bands) with any security of tenure, unless changes are made to the International Table. ESA

N87-15381# Mobile Satellite Corp., King of Prussia, Pa.
THE UNITED STATES MOBILE SATELLITE SERVICE
J. D. Kiesling *In* ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 95-98 (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

The proposed U.S. mobile satellite service provides services to America's nonurban land mass where terrestrial mobile systems find little application. Based on state of the art satellite technology, and use of omnidirectional, steered, and fixed antennas, a broad range of services at affordable prices will be

available, including land mobile, service to intra coastal waterways, and aviation. ESA

N87-15382# International Maritime Satellite Organization, London (England).
SPECTRUM REQUIREMENTS FOR THE LAND MOBILE SATELLITE SERVICE, INMARSAT
In ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 99-100 (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

The regulatory situation concerning frequency allocations, and the spectrum requirements for maritime and aeronautical satellite services are reviewed. It is concluded that there is inadequate spectrum for a large scale telephony service, but a low bit rate message service could be supported. ESA

N87-15383# Ewbank Preece Consulting Ltd., Brighton (England).
FREQUENCY ALLOCATION IN THE LAND MOBILE SATELLITE SERVICE
L. Lake, K. Buni, and I. Young *In* ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 101-106 (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

Possible frequency bands that could be used to provide a land mobile satellite service (LMS) across Europe in 1995-2005 were investigated. Market studies of demand for a pan-European service; current proposals for land mobile satellite service outside of Europe; and projected technical development in components of a land mobile satellite service were used to derive a baseline configuration for a practical service within the timeframe, which in turn was used to define the frequency bandwidth requirements. The frequency bands 1545 to 1559MHz and 1646.5 to 1660.5MHz should be shared between the LMS and the aeronautical mobile satellite service (R) on a basis of agreed coordination between the parties. The frequency bands 2500 to 2520MHz and 2600 to 2620MHz should be reassigned to the LMS on a primary basis. ESA

N87-15384# International Maritime Satellite Organization, London (England).
INSTITUTIONAL ASPECTS: INMARSAT **c81**
In ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 107-108 (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

It is suggested that an international approach is required for the provision of land mobile satellite services and that INMARSAT could provide the required institutional framework. Factors which necessitate such an approach including spectrum considerations, coverage, economic factors most notably in relation to cellular systems, the thin-route nature of the obtainable market, and the need for international control and participation are identified. This latter requirement is driven by political considerations and by the need, in the interests of all users, to ensure common international equipment standards to stimulate the development of user markets and hence economic viability. An INMARSAT/European effort to test and demonstrate a pan-European thin-route land-mobile communications capability from mid-1987 is outlined. ESA

N87-15385# Direction Generale des Telecommunications, Pleumeur-Bodou (France).
ACTIVITIES OF THE EUROPEAN CONFERENCE OF POSTS AND TELECOMMUNICATIONS (CEPT) SPECIAL GROUP ON MOBILE COMMUNICATIONS (GSM)
P. Dupuis *In* ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 111-114 (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

The group on mobile communications (GSM) of the European Conference of Posts and Telecommunications is in charge of specifying a harmonized mobile radio communication system adapted to the needs and to the technological environment of the coming decades. The means at the disposal of GSM, the objectives of the system, (basic requirements), the program, and time schedule are presented. The strength of GSM and the dangers which it must avoid are pointed out. ESA

N87-15386# Centre National d'Etudes Spatiales, Toulouse (France).
THE LOCSTAR SATELLITE RADIOPOSITIONING SYSTEM [LE SYSTEME LOCASTAR DE RADIO-FREQUENCE PAR SATELLITE] **c04**
D. Hernandez *In* ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 115-118 In FRENCH (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

A satellite network for radiolocation, radio navigation, and message transmission for Europe, Africa, and the Middle East is proposed. It features random access and PN code spread spectrum techniques. It permits position determination to within 10 to 100 m, and alphanumeric message exchange between mobiles and their base. ESA

N87-15387# Telesat Canada, Ottawa (Ontario).
MSAT SYSTEM AND SERVICE DESCRIPTION
D. J. Sward and M. F. Lok *In* ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 119-123 (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

A satellite based mobile communications system known as MSAT, was developed in Canada. It will be used primarily in rural and remote regions where the wide-area coverage and extended range features are of greatest benefit. Applications can be found in trucking, mineral exploration, forestry, law enforcement, coastal and in-land shipping, light aircraft communications, national paging, environmental sensing, remote monitoring and control of utilities, and emergency relief. The services which are likely to be offered initially on MSAT include mobile radio, mobile telephone, mobile data, wide-area paging, supervisory control, and data collection. Maritime and aeronautical services can also be provided as well as conventional telephone service to locations which for technical and economic reasons cannot be served by the fixed terrestrial and satellite infrastructures. ESA

N87-15388# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
A LAND MOBILE SATELLITE FOR DIGITAL COMMUNICATIONS IN EUROPE
R. Rogard *In* ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 125-130 (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

Activities of ESA in the field of satellite-based land mobile services are reviewed. Selection of services which could best be provided by satellite, in the context of the terrestrial complement to a future pan-European cellular system is discussed. The impact on system architecture is assessed. A system demonstration planned for the beginning of 1987 and currently in the stage of hardware design is presented. An automatic repeat request scheme and a CDMA approach, are presented and justified. ESA

N87-15389# Science Research Council, Chilton (England). Rutherford Appleton Lab.
LAND MOBILE SATELLITE SYSTEMS USING HIGHLY ECCENTRIC ORBITS **c18**
J. R. Nordbury *In* ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 131-136 (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

The advantages of using a 12 hr Molniya orbit for land mobile applications are outlined. The much improved propagation characteristics, compared with the geostationary case, can be utilized to reduce the overall link margin to a few decibels and to exploit the advantages of higher bit rate TDMA access schemes. An experimental payload, which includes features such as full on-board

processing, and would provide a facility for demonstrating the potential of the Molniya orbits for mobile applications is described. ESA

N87-15390*# National Aeronautics and Space Administration. Pasadena Office, Calif.
GROUND PLANE INTERFERENCE ELIMINATION BY PASSIVE ELEMENT Patent Application
Mark E. Bonebright, inventor and Derling Killion, inventor Filed 30 Jul. 1986 12 p
(Contract NAS7-918)
(NASA-Case-NPO-16632-1-CU; NAS 1.71:NPO-16632-1-CU; US-Patent-Appl-SN-890586) Avail: NTIS HC A02/MF A01 CSCL 17B

The radiation pattern of a beam at elevation angles near the horizon is improved for phased array antennas by control of the radiation field intensity near the horizon to reduce multipath disturbances, and to improve the axial ratio of a circularly polarized phased array antenna. This is accomplished by placing a parasitic phase shifting element directly below the antenna beam axis. The waveguide section is designed to produce a phase shift in the portion of antenna radiation energy passing through it to cancel some of the radiation energy in the direction of the horizon. The spacing of the waveguide section in front of the antenna is determined empirically for optimum results, i.e., for reduction of beam power below about 20 deg. without affecting beam power at high elevation angles. NASA

N87-15391*# LinCom Corp., Los Angeles, Calif.
SPACE SHUTTLE/TDRSS COMMUNICATION AND TRACKING SYSTEMS ANALYSIS Final Report
W. C. Lindsey, C. M. Chie, R. Cideciyan, K. Dessouky, Y. T. Su, and C. S. Tsang 30 Apr. 1986 400 p
(Contract NAS9-17349)
(NASA-CR-171948; NAS 1.26:171948; TR-8514-02) Avail: NTIS HC A17/MF A01 CSCL 17B

In order to evaluate the technical and operational problem areas and provide a recommendation, the enhancements to the Tracking and Data Delay Satellite System (TDRSS) and Shuttle must be evaluated through simulation and analysis. These enhancement techniques must first be characterized, then modeled mathematically, and finally updated into LinCsim (analytical simulation package). The LinCsim package can then be used as an evaluation tool. Three areas of potential enhancements were identified: shuttle payload accommodations, TDRSS SSA and KSA services, and shuttle tracking system and navigation sensors. Recommendations for each area were discussed. B.G.

N87-15392*# Hughes Aircraft Co., Englewood, Colo. Engineering Lab.
DEVELOPMENT OF Ku-BAND RENDEZVOUS RADAR TRACKING AND ACQUISITION SIMULATION PROGRAMS Final Report
1 Aug. 1986 533 p
(Contract NAS9-17501)
(NASA-CR-171950; NAS 1.26:171950; DRL-T-2003; It-2) Avail: NTIS HC A23/MF A01 CSCL 17I

The fidelity of the Space Shuttle Radar tracking simulation model was improved. The data from the Shuttle Orbiter Radar Test and Evaluation (SORTE) program experiments performed at the White Sands Missile Range (WSMR) were reviewed and analyzed. The selected flight rendezvous radar data was evaluated. Problems with the Inertial Line-of-Sight (ILOS) angle rate tracker were evaluated using the improved fidelity angle rate tracker simulation model. B.G.

N87-15393*# Goodyear Aerospace Corp., Litchfield Park, Ariz.
INTERLEAVED ARRAYS ANTENNA TECHNOLOGY DEVELOPMENT
27 Feb. 1986 59 p
(Contract NAS9-17312)
(NASA-CR-171951; NAS 1.26:171951; GERA-2758) Avail: NTIS HC A04/MF A01 CSCL 20N

Phase one and two of a program to further develop and investigate advanced graphite epoxy waveguides, radiators, and components with application to space antennas are discussed. The objective of the two phases were to demonstrate mechanical integrity of a small panel of radiators and parts procured under a previous contract and to develop alternate designs and applications of the technology. Most of the emphasis was on the assembly and test of a 5 x 5 element module. This effort was supported by evaluation of adhesives and waveguide joint configurations. The evaluation and final assembly considered not only mechanical performance but also producibility in large scale. Author

N87-15394# RAND Corp., Santa Monica, Calif.
A COMPARISON OF SINGLE-SIDEBAND, SUPPRESSED-CARRIER AND DOUBLE-SIDEBAND, FULL-CARRIER AMPLITUDE MODULATION
Edward Bedrosian and William Sollfrey Aug. 1986 15 p
(P-7254) Avail: NTIS HC A02/MF A01

The spectral economy of SSB (single-sideband, suppressed-carrier modulation) in comparison with conventional AM has long been recognized. However, the use of SSB, particularly for data transmission, has been limited by the large peak envelope excursions caused by pulse-like waveforms. Even in the transmission of analog signals, such as speech or music, undesirable peaks can be encountered. SSB and AM signals are analyzed using a waveform that can be varied in shape from a spike through a sine wave to a square wave by varying a parameter. The average sideband powers and the peak envelope powers are then calculated and compared. It is shown that the ratio of average sideband power to peak envelope power for AM is more favorable than that for SSB for squarish modulating signals. However, the ratio for SSB is about 9dB higher than it is for AM for modulating signals ranging in shape from a sine wave to a spike. Author

N87-15395*# National Aeronautics and Space Administration, Washington, D.C.
CURRENT STATUS AND EXPECTED DEVELOPMENTS IN THE AREA OF SATELLITE COMMUNICATIONS IN THE LATIN AMERICAN AND CARIBBEAN REGION
S. Ayala Sep. 1986 16 p Transl. into ENGLISH of "Estado Acual y Desarrollo Esperado en la Region de America Latina y el Caribe en la Esfera de las Comunicaciones via Satelite" (Mexico), 1986 p 1-24 Presented at the Regional Convention of Specialists from the United Nations and the Economic Commission for Latin America and the Caribbean on Science and Space Technology and its Applications, Cartagena, Colombia, Jun. 1986 p 1-24 Transl. by The Corporate Word, Inc., Pittsburgh, Pa. Original document was prepared by Secretariat of Communications and Transportation, Mexico
(Contract NASw-4006)
(NASA-TM-88000; NAS 1.15:88000) Avail: NTIS HC A02/MF A01 CSCL 17B

The present capabilities of various Latin American countries in the area of satellite communications are discussed. Their current needs in this area are covered and how these needs are now being met, as well as prospects for future advancements. Author

N87-15396# Naval Research Lab., Washington, D. C.
DEGRADATION IN PERFORMANCE OF ADAPTIVE NULL-STEERING ANTENNAS Interim Report
Walter K. Kahn 20 Jun. 1986 11 p
(AD-A169663; NRL-8984) Avail: NTIS HC A02/MF A01 CSCL 17/9

This report quantifies the degradation in the overall main beam gain performance capability of any phased array antenna which necessarily accompanies the formation of pattern nulls in a number of directions. The adaptive formation of pattern nulls constitutes one strategy through which a radar may seek to suppress effects of stand-off jammers. However, an array comprising a finite number of elementary radiators disposes of only a finite number of degrees of freedom. Thus it has long enough been recognized as the number of nulls required approaches the number of degrees of freedom, antenna performance deteriorates. Here, this fact is given

a simple quantitative formulation very much in accord with intuitive expectation. GRA

N87-15397# Naval Ocean Systems Center, San Diego, Calif.
RADIATION RESISTANCE OF THIN ANTENNAS OF ARBITRARY ELEVATION AND CONFIGURATION OVER PERFECTLY CONDUCTING GROUND Interim Report, Dec. 1985 - Jun. 1986
R. A. Pappert Jun. 1986 66 p
(AD-A170945; NOSC/TR-1112) Avail: NTIS HC A04/MF A01 CSCL 09/5

Dipole segmentation is used to estimate the radiation resistance of thin antennas of arbitrary elevation and configuration over a perfectly conducting ground plane. Sample results include half-wave linear antennas of varying inclination, half-wave spiral type antennas, and a TACAMO configuration. Utility of the method for estimating the radiation resistance of VLF/LF trailing-wire antennas from aircraft depends upon the extent to which the current distribution deviates from a sinusoid. That deviation is due in part to finite wire thickness as well as to the finite conductivity of both wire and ground. The influence of those effects requires further study. Author (GRA)

N87-15398# Naval Ocean Systems Center, San Diego, Calif.
EFFECTS OF EXTENDED CAMERA BASELINE AND IMAGE MAGNIFICATION ON TARGET DETECTION TIME AND TARGET RECOGNITION WITH A STEREOSCOPIC TV SYSTEM Interim Report, Jan. - Dec. 1985
E. H. Spain Feb. 1986 38 p
(AD-A171063; NOSC/TR-1100) Avail: NTIS HC A03/MF A01 CSCL 17/2

Accomplishments of the first year of a two-year investigation of remote presence with a stereoscopic TV display are summarized. A dual-channel video recording and playback system was constructed, consisting of a synchronized pair of optical video disk recorders under computer control, used to record stereoscopic still video frame-pairs in the field and play them back in a controlled laboratory environment for visual performance data collection. Three experiments were conducted to assess the independent effects of camera interaxial separation, image magnification, and their simultaneous interaction on target detection and recognition. The results of these experiments suggested that both image magnification and increases in camera interaxial separation are useful strategies for enhancing visual performance. The interaction of these two factors did not disrupt performance. Recommendations are made for the conduct of subsequent studies and for the design of stereo TV displays for terrestrial reconnaissance applications. GRA

N87-15399# Department of the Army, Washington, D. C.
HIGHLY DECOUPLED COSITED ANTENNAS Patent Application
Donn V. Campbell, inventor (to Army), Palemon W. Dubowicz, inventor (to Army), and Robert T. Hoverter, inventor (to Army) Filed 1 Aug. 1986 19 p
(AD-D012446; US-Patent-Appl-SN-892015) Avail: NTIS HC A02/MF A01 CSCL 09/5

Two cosited omnidirectional biconical antennas are respectively tilted plus and minus 45 degrees (+ or - 45 deg.) with respect to the vertical and, therefore, are perpendicular (90 deg.) with respect to each other to effect polarization mismatch and near field decoupling. In combination with the described antennae orientation, high impedance cable chokes are added in series with the coaxial cable antennae feed lines to suppress induced parasitic RF currents. Author (GRA)

N87-15400# Naval Ocean Systems Center, San Diego, Calif.
LONGWAVE PROPAGATION: A BRIEF REVIEW Interim Report, Oct. 1984 - Sep. 1985
F. P. Snyder Jun. 1986 39 p
(AD-A171147; NOSC/TD-909) Avail: NTIS HC A03/MF A01 CSCL 20/14

This brief review of the state-of-knowledge of longwave electromagnetic propagation in the near-Earth environment includes some discussions of commonly available computer models for this frequency regime. The frequency range considered in this report encompasses the ELF, the VLF, and the lower part of the LF band. Because longwave propagation is characterized by high stability in both amplitude and phase, and because these frequencies propagate to very great distances, longwave signals are of considerable practical importance to global communications, navigation systems, and to global frequency and time comparisons. Author (GRA)

N87-15401# Nebraska Univ., Lincoln. Dept. of Electrical Engineering.
DEPOLARIZATION AND SCATTERING OF ELECTROMAGNETIC WAVES Final Report, 17 May 1982 - 30 Jun. 1986
Ezekiel Bahar Jun. 1986 16 p
(Contract DAAG29-82-K-0123)
(AD-A171217; ARO-18120.17-EL) Avail: NTIS HC A02/MF A01 CSCL 20/14

The principal purpose of the research is to investigate radio wave scattering and depolarization by conducting objects of irregular shape. To test the programs and in order to develop better physical interpretations of the results, scatterers with simple shapes are considered first. Thus, the full wave solutions for scattering and depolarization are compared with known solutions to the problem. The second phase of this work is devoted to the problem of scattering and depolarization by irregularly shaped objects. Both one- and two-dimensional problems are considered. To account for medium losses the scatterer is characterized by a complex permittivity and permeability. Using the full wave approach it is not necessary to employ the approximate impedance boundary conditions. Special attention is given to determining the normalized co-polarized and cross-polarized backscatter cross section. The full wave solutions for the scattering cross sections are compared with the perturbational and physical optics solutions. Special attention is also given to the polarization dependence of the scattering cross sections tering cross sections. GRA

N87-15402# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A COMMUNICATION BANDWIDTH MODEL FOR SHUFFLE-EXCHANGE AND AUGMENTED SHUFFLE-EXCHANGE INTER-PROCESSOR COMMUNICATION NETWORKS Ph.D. Thesis
Charles R. Bisbee, III 1986 131 p
(AD-A171287; AFIT/CI/NR-86-115D) Avail: NTIS HC A07/MF A01 CSCL 17/2

A failure dependent bandwidth model for shuffle exchange (S/E) and augmented shuffle exchange (S/E+) interconnection networks is presented. The models are based on probabilities of either data or address mode failures for the individual binary switches which comprise the SE or SE+ network. The model gives the expected bandwidth as a function of the probability of failures in these switches. The model, which is consistent with those previously published when the probability of failure is zero, is first developed for the S/E network. This model is extended to the S/E+ network by developing a special model for the input stage of the S/E+ network and then proving that, to within a close approximation, the conditions necessary for the S/E model hold at the outputs of first stage of the S/E+. The model is verified using a computer simulation. An example is presented which demonstrates use of the model to predict the effects of several fault tolerance schemes on the bandwidth of these networks. The model demonstrates that, when used as a reliability enhancement, the extra stage of the S/E+ causes a reduction in bandwidth as compared to an S/E network. GRA

N87-15403# Army Military Personnel Center, Alexandria, Va.
INVESTIGATION OF THE UHF MOBILE-RADIO PROPAGATION CHANNEL IN A TEMPERATE-ZONE FORESTED ENVIRONMENT Final Report
Kenneth J. White 13 Aug. 1986 96 p
(AD-A171431) Avail: NTIS HC A05/MF A01 CSCL 17/2

Experimental verification of the stochastic power-spectral-density theory of radio propagation, as applied to a mobile receiver

in a forested environment, is presented. Using a novel technique to achieve fractional-hertz resolution of the diffuse and direct wave components of the Doppler-spread received spectrum, the resultant data taken at 432 MHz shows that the angle of arrival of the diffuse component of the incident energy at the receive antenna is described by an uniform probability density function for both vertical and horizontal polarizations. Given an 8.8 km transmission path with the signal penetrating 1.3 km of forest just before reaching the receiver, the ratio of coherent (direct wave) intensity to total received signal power is 42% for horizontal polarization and 5% for vertical polarization. The results of the research indicate that long transmission paths in foliage are better characterized by a forward-scattering mechanism than by a lateral wave model.
Author (GRA)

N87-15404# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
INVESTIGATION OF MILLIMETER WAVE PROPAGATION IN THE ATMOSPHERE Final Report, 15 Sep. 1981 - 20 Mar. 1986
S. F. Clifford, R. J. Hill, and W. P. Schoenfeld 18 Jul. 1986 155 p
(Grants ARO-55-81; ARO-21-82; ARO-123-83; ARO-127-84; ARO-122-85)
(AD-A171526; ARO-18029.18-GS) Avail: NTIS HC A08/MF A01 CSCL 20/14

This report documents the results of five years of research conducted on the propagation of millimeter waves through the atmospheric surface layer. At a site in Flatville, Illinois, radiation in the frequency range from 116 GHz to 230 GHz was propagated along at 1/4 km horizontal path instrumented with multiple meteorological sensors to characterize the state of the atmosphere. The millimeter wave beam propagated at a height of 3.7m to a receiver van that had four receiver antennas spaced in a non-redundant manner to allow measurements of amplitude, phase difference and mutual coherence at spacings from 1.43m to 10m. Comparisons between the clear air propagation data and theory showed close agreement. Author (GRA)

N87-15405# Naval Underwater Systems Center, New London, Conn.
SIGNAL-TO-NOISE RATIO REQUIREMENTS FOR DETECTION OF MULTIPLE PULSES SUBJECT TO PARTIALLY CORRELATED FADING WITH CHI-SQUARED STATISTICS OF VARIOUS DEGREES OF FREEDOM
Albert H. Nuttall and Edward S. Eby 2 Jun. 1986 62 p
(AD-A172223; NUSC-TR-7707) Avail: NTIS HC A04/MF A01 CSCL 09/3

The transmitted signal in a fading medium is composed of several pulses separated in time so as to achieve diversity and thereby combat deep fades and loss of signal. Receiver processing consists of matched filtering of each of the pulses, followed by summation of the squared envelopes of all the filter outputs. In addition to additive Gaussian background noise, the signal is subject to slow medium fading which has a chi-squared first-order distribution and which may be correlated from pulse to pulse to an arbitrary degree. The false alarm and detection probabilities of this system are derived in various series expansions which are amenable to efficient computer evaluation. Programs are presented and exercised for various combinations of signal-to-noise ratio, number of pulses, degree of correlated fading, and (non-integer) number of degrees of freedom of the chi-squared fading. Required input signal-to-noise ratios for several false alarm and detection probabilities are computed and plotted for cases of the fading normalized correlation coefficient ranging from 0 to 1; results for a nonfading medium are superposed for easy comparison. Special cases are dependent and independent Rayleigh amplitude fading. GRA

N87-15406# Naval Ocean Systems Center, San Diego, Calif.
STATIONARY/SLOWLY MOVING TARGET DETECTION IN STRONG BACKGROUND CLUTTER Interim Report, Oct. - Dec. 1984
Larry B. Stotts May 1986 46 p
(AD-A172225; NOSC/TR-1108) Avail: NTIS HC A03/MF A01 CSCL 17/9

This report presents the maximum likelihood approach to nonmoving resolved/partially resolved target extraction from correlated images that can be extended to the underresolved, weak target case by restructuring the basic problem development in terms of the inherent two-dimensional aspects found in most remotely sensed images. The report also outlines the research required to extend application of the restructured development to an optimum processing approach for detecting stationary or slowly moving targets in clutter. GRA

N87-15407# Lightning and Transients Research Inst., St. Paul, Minn.
AN EXPERIMENTAL AND THEORETICAL STUDY OF NUCLEAR-EMP (ELECTROMAGNETIC PULSE)-TYPE LIGHTNING SIMULATORS WITH COMBINED PEAKING CAPACITOR AND CROWBAR Final Report, Aug. 1984 - Mar. 1985
John D. Robb and Rodney A. Perala Mar. 1986 35 p
(Contract F33615-84-C-3405)
(AD-A172648; AFWAL-TR-86-3045) Avail: NTIS HC A03/MF A01 CSCL 20/14

Experimental and theoretical studies have been carried out to determine the feasibility of combining nuclear electromagnetic-pulse-type lightning simulators which use peaking capacitors with crowbar switches to provide both a double exponential lightning test pulse with a long unipolar tail and a very fast risetime. The purpose of the simulator is to provide a relatively economical and simple lightning simulator for the indirect effects testing of full sized advanced composite aerospace vehicles. The theoretical analysis and experimental investigations have verified the validity of the concept of combining the peaking capacitor and the crowbar switch to obtain high-current waveforms which also have a high current rate of rise with economical components. GRA

N87-15408# Mitre Corp., Bedford, Mass.
PREDICTING ANTENNA SIDELOBE PERFORMANCE Final Report
Philip D. Kaplan Aug. 1986 38 p
(Contract F19628-84-C-0001)
(AD-A172708; MTR-9750; ESD-TR-86-234) Avail: NTIS HC A03/MF A01 CSCL 09/5

Given a set of antenna array performance requirements, the dimensions and illumination taper of an ideal array may be determined. However, random errors in actual manufacturing lead to uncertainty as to actual array performance. It is shown here that the performance is nonetheless predictable with a probability function that rests on the contractor's decisions in the fabrication of the array. The derivation of curves that relate this probability function to a range of conditions, overdesign allowances and production tolerances, is the salient feature of this paper. When sidelobe specifications allow for occasional statistical pop-ups, the specified levels may be better adapted to requirements. The contractor, in turn, could decide on the proper choice between overdesign and tolerances, in a measured response to the specified performance. GRA

N87-15409# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
METHODS OF MULTIPLE ACCESS COMMUNICATIONS WITH ENERGY DETECTORS M.S. Thesis
Roy D. Yates May 1986 33 p
(Contracts N00014-84-K-0357; DAAG29-84-K-0005; Grant NSF ECS-83-10698)
(AD-A172757; LIDS-TH-1557) Avail: NTIS HC A03/MF A01 CSCL 17/2

For the infinite user population multiple access communication channel in which the number of colliding packets is known exactly, has been shown previously that it is possible to achieve a throughput arbitrarily close to one. This result is examined. A particular two-step problem formulation is described. In this strategy, the time axis is divided into many small non-overlapping

segments. By enabling subsets of this set of segments, collisions are generated to learn the number of data packets in each segment. In the second stage, each segment found to contain one or more data packets is resolved by splitting. It is shown that the problem of identifying the number of packets in each segment given the collision results is NP complete. A tradeoff between complexity and throughput is described. The number of packets in the backlog is lower bounded in terms of attainable throughput. The bound indicates that achieving high throughput requires an enormous amount of computation and very large delay, indicating that all strategies of this type are essentially useless for obtaining high throughput. GRA

N87-15410# National Telecommunications and Information Administration, Boulder, Colo. Inst. for Telecommunication Sciences.
MODEL OF A SHAPED-BEAM EMISSION PATTERN OF A SATELLITE ANTENNA FOR INTERFERENCE ANALYSIS
H. Akima Jul. 1986 65 p
(PB86-238755; NTIA-86-197) Avail: NTIS HC A04/MF A01 CSCL 09E

For efficient use of the geostationary satellite orbit, mutual interference among satellite systems must be analyzed in the planning stage of the systems. To conserve the transmitter power, many satellite antennas in the FSS (fixed-satellite service) use the so-called shaped-beam emission patterns that cover their service areas. A computer model of a shaped-beam pattern is needed in the analysis of mutual interference. A simple model is presented for calculating the antenna gain in the direction of an earth point from several contour lines given on the map of the Earth, each corresponding to an antenna gain value. GRA

N87-15247# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
APC: A CONCEPT DEMONSTRATION OF END-TO-END PACKETIZED DATA TRANSPORTATION TECHNIQUES
W. Markwitz and G. Mayer *In its* Colloquium about Joint Projects within the DFVLR/ISRO Cooperation Jul. 1986 p 93-103 (For primary document see N87-15240 07-12)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne, West Germany DM 46

N87-15251# Indian Space Research Organization, Ahmedabad. Space Applications Center.
SATELLITE COMMUNICATIONS
E. V. Chitnis *In* DFVLR Colloquium about Joint Projects with the DFVLR/ISRO Cooperation Jul. 1986 p 137-142 (For primary document see N87-15240 07-12)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne, West Germany DM 46

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

N87-15411 Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
LIMIT CYCLES IN DIGITAL FILTERS: A BIBLIOGRAPHY 1975-1984
J. H. T. Geerlings, comp. Dec. 1985 20 p
(EUT-85-E-154; ISBN-90-6144-154-4; ISSN-0167-9708; ETN-86-98710) Avail: NTIS HC A02

A bibliography of 242 references on nonlinear effects in digital filters, in particular, on limit cycles, is given. ESA

N87-15412 Pittsburgh Univ., Pa.
RADIO FREQUENCY MONITORING OF TURBINE GENERATORS Ph.D. Thesis
Franklin Timothy Emery 1983 111 p
Avail: Univ. Microfilms Order No. DA8617211

An increased understanding of radio frequency arc detection in large turbine generators is sought. Prior work led to the development of an on-line fixed frequency arc monitor for application on large turbine generators. Long term experience with the monitor has shown that it is possible for a certain type of stator winding arcing condition to occur and not be detected. In one documented generator stator failure, where evidence of excessive arcing in the stator had occurred, the fixed frequency RF monitor failed to give an indication. To determine why the RF monitor did not respond, a study was done to obtain a better understanding of the propagation of RF currents through a generator stator winding. The study consisted of a series of RF measurements made in conjunction with a computer circuit analysis of a large turbine generator stator winding. The measured and calculated response of the generator are in good agreement resulting in a good understanding of RF signal propagation in a stator winding. An improved method of RF arc detection was then developed which involves the measurement of the generator's neutral circuit RF voltage over the frequency range from 3.0 MHz to 7.0 MHz. voltage over the frequency range from 3.0 MHz to 7.0 MHz. Dissert. Abstr.

N87-15413*# National Aeronautics and Space Administration. Pasadena Office, Calif.
LARGE TV DISPLAY SYSTEM Patent Application
Hua-Kuang Liu Filed 30 Sep. 1986 11 p
(Contract NAS7-918)
(NASA-Case-NPO-16932-1; NAS 1.71:NPO-16932-1; US-Patent-Appl-SN-913433) Avail: NTIS HC A02/MF A01 CSCL 09C

A relatively small and low cost system is provided for projecting a large and bright television image onto a screen. A miniature liquid crystal array is driven by video circuitry to produce a pattern of transparencies in the array corresponding to a television image. Light is directed against the rear surface of the array to illuminate it, while a projection lens lies in front of the array to project the image of the array onto a large screen. Grid lines in the liquid crystal array are eliminated by a spacial filter which comprises a negative of the Fourier transform of the grid. NASA

N87-15414*# National Aeronautics and Space Administration. Pasadena Office, Calif.
COAXIAL CABLE CONNECTOR Patent Application
Edward Caro, inventor (to NASA) and Walter J. Bonazza, inventor (to NASA) Filed 8 Sep. 1986 10 p
(Contract NAS7-918)
(NASA-Case-NPO-16764-1; NAS 1.71:NPO-16764-1; US-Patent-Appl-SN-704513) Avail: NTIS HC A02/MF A01 CSCL 09C

A coaxial cable connector is provided, which resists radio frequency breakdown in coaxial cables used in the vacuum of outer space. The connector body surrounds an insulator which includes an easily compressible elastomeric portion. An insulated coaxial cable is prepared so its insulation projects beyond the outer conductor and compresses the elastomeric portion of the connector insulator. NASA

N87-15415# Sandia National Labs., Albuquerque, N. Mex.
PROGRAM TO ANALYZE THE FAILURE MODE OF LEAD-ACID BATTERIES
David Zuckerbrod (Westinghouse Research and Development Center, Pittsburgh, Pa.) Mar. 1986 32 p Prepared for US Nuclear Regulatory Commission
(Contract DE-AC04-76DP-00789)
(NUREG-CR-4833; SAND-86-7080) Avail: NTIS HC A03/MF A01

The electrical characteristics of large lead-acid cells from nuclear power plants were studied. The overall goal was to develop non-destructive tests to predict cell failure using this easily obtained

information. Cell capacitance, internal resistance, reaction resistance for hydrogen evolution and cell capacity were measured on a lead-calcium cell in good condition. A high float voltage and low internal resistance were found to correlate with good cell capacity in cells selected from a set of six lead-antimony cells in poor conditions. Author

N87-15416*# National Aeronautics and Space Administration, Washington, D.C.
STUDY OF NICKEL HYDROXIDE ELECTRODES. 2: OXIDATION PRODUCTS OF NICKEL (2) HYDROXIDES
H. Bode, K. Demelt, and J. White Aug. 1986 34 p Transl. into ENGLISH from Zeitschrift fuer Anorganische und Allgemeine Chemie (West Germany), v. 336, no. 1-2, 1969 p 1-21 Transl. by SCITRAN, Inc., Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88473; NAS 1.15:88473) Avail: NTIS HC A03/MF A01 CSCL 10C

Pure phases of some oxidized Ni oxides were prepared galvanimetrically with the Ni(2) hydroxide electrode of an alkaline battery. The crystallographic data of these phases, their chemical behavior, and conditions of transition were studied. B.G.

N87-15417# Naval Ocean Systems Center, San Diego, Calif.
INDUCED INSULATOR VOLTAGE IN TRANSMITTER ANTENNA GUY CABLES Final Report, Jul. - Dec. 1985
P. M. Hansen, D. G. Fern, and C. F. Ramstedt Dec. 1985 41 p (AD-A169656; NOSC/TD-868) Avail: NTIS HC A03/MF A01 CSCL 09/3

A method is examined for the analytical determination, with very good accuracy, of the RF voltage that will be developed across insulators in antenna guy cables. The Numerical Electromagnetics Code was used to develop the predictions, which were then compared with measurements conducted on a model antenna. Calculated and measured values of the mutual impedance (the ratio of induced voltage to antenna feedpoint current) were obtained for a scaled configuration containing a vertical radiator and one top-loading guy cable. Eighteen test conditions were examined, with nine insulator location patterns (i.e., one to five insulators) and two insulator capacitances. For those test conditions chosen to represent realistic antennas, the mean and maximum differences between calculated and measured mutual impedance values are 0.12 and 9.93 percent, respectively. The small difference indicates that the method is well suited both to engineering design considerations and to the investigation of the adequacy of insulator withstand voltages at existing transmitter sites. GRA

N87-15418# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
NOISES OF KLYSTRON OSCILLATORS OF A SMALL POWER
S. A. Kornilov, V. A. Savshinskiy, and S. D. Uman 3 Jul. 1986 362 p Transl. into ENGLISH of the book "Shumy Klistro ynnykh Generatorov Maloy Moshchnosti" Moscow, USSR, Sovetskoye Radio, 1972 p 1-200
(AD-A170220; FTD-ID(RS)T-0499-86) Avail: NTIS HC A16/MF A01 CSCL 09/1

Operating principles and noisiness of klystron oscillators; parameters which characterize noisiness of generators, and the methods of their measurement; requirements, presented to by klystron oscillator in the radar devices; ways of reduction in the noises of klystron oscillators; and some information from the theory of random processes are discussed. Tables of the parameters, utilized for describing the spectral characteristics of fluctuations are given. GRA

N87-15419# Department of the Navy, Washington, D. C.
STIBINE FILTER FOR ANTIMONIAL LEAD ACID BATTERIES Patent Application
James H. Carder, inventors (to Navy), Anh H. Le, inventor (to Navy), and Chester M. Dacres, inventor (to Navy) Filed 3 Jul. 1986 14 p
(AD-D012427; US-Patent-Appl-SN-880524) Avail: NTIS HC A02/MF A01 CSCL 10/3

This patent application relates to storage cells and more particulary to stibine filters antimonial lead acid storage cells. The addition of small amounts of antimony to lead produces lead electrode having greatly improved mechanical properties. This substantially increases the life of lead-acid batteries. Stibine is removed from gases generated in antimonial lead-acid batteries by using a filter having carbon powder (especially activated charcoal) as the active agent. GRA

N87-15420# Department of the Air Force, Washington, D.C.
THERMAL VACUUM HEATER ARRAY APPARATUS Patent Application
John E. Allen, inventor (to Air Force) Filed 1 Apr. 1986 16 p
(AD-D012436; US-Patent-Appl-SN-846691) Avail: NTIS HC A02/MF A01 CSCL 14/2

An electric resistance heater array has an open metal frame with multiple heater wires of heavy guage, U-shaped Nichrome wire that are vertically spaced across the panel. The lower vertical portions of the heater wire are encased in ceramic sleeves which insulate the wire from the small apertures in the metal frame that support the wire by its constraints upon side to side and fore to aft movement. GRA

N87-15421# Department of the Army, Washington, D. C.
METHOD OF INCREASING THE USEFUL LIFE OF RECHARGEABLE LITHIUM BATTERIES Patent Application
Otto C. Wagner, inventor (to Army) Filed 9 Jul. 1986 17 p
(AD-D012444; US-Patent-Appl-SN-887142) Avail: NTIS HC A02/MF A01 CSCL 10/3

The cycle life of rechargeable lithium batteries is significantly prolonged by applying to the battery as a charging mode a current interrupted at intervals of 1 milliseconds to 9 seconds in a frequency range of about 0.1 to about 10 Hertz. GRA

N87-15422# Department of the Army, Washington, D. C.
MILLIMETER WAVE MICROSTRIP CIRCULATOR UTILIZING HEXAGONAL FERRITES Patent Application
Richard A. Stern, inventors (to Army) and Richard W. Babbitt, inventor (to Army) Filed 18 Jul. 1986 14 p
(AD-D012445; US-Patent-Appl-SN-887413) Avail: NTIS HC A02/MF A01 CSCL 09/1

A millimeter-wave circulator for microstrip use. The device employs an hexagonal ferrite element to selectively direct the propagation of electromagnetic energy through a Y-junction circulator. The device does not require an external biasing magnet and provides improved bandwidth for high frequency operation. Author (GRA)

N87-15423# Texas Univ., Austin. Dept. of Chemistry.
DIGITAL SIMULATION OF THE MEASURED ELECTROCHEMICAL RESPONSE OF REVERSIBLE REDOX COUPLES AT MICROELECTRODE ARRAYS: CONSEQUENCES ARISING FROM CLOSELY SPACED ULTRAMICROELECTRODES, REVISION
Allen J. Bard, Joseph A. Crayston, Gregg P. Kittlesen, Theresa V. Shea, and Mark S. Wrighton Apr. 1986 60 p
(Contract N00014-84-K-0428)
(AD-A170943; TR-4) Avail: NTIS HC A04/MF A01 CSCL 07/4

Diffusion to arrays of closely spaced (1.2 micrometer to 0.2 micrometer) ultramicroelectrodes (50 micrometers x 2.3 micrometers) was studied by digital simulation and experimentally by examining the redox behavior of Ru(NH3)6(3+) in H2O. Cylindrical diffusion of solution species resulted in quasi-steady-state currents at the microband electrodes. Generation-collection experiments, analogous to rotating ring-disk collection experiments, resulted in larger generator currents than those observed at a single microelectrode due to the back diffusion of products to the neighboring microelectrode. A collection efficiency of 93% was observed for the re-oxidation of Ru(NH3)6(2+) generated at a central microelectrode 0.2 micrometer from two flanking collector microelectrodes. This experiment as well as generator-single collector electrode pairs was simulated at a two-dimensional rectangular expanding grid and yielded results in good agreement with the experiment. Predictions of the model that the collection

efficiency principally depends on the gap size, rather than electrode width, were tested experimentally. The novel application of microelectrode arrays to the study of the follow-up reactions of electrogenerated intermediates is demonstrated. GRA

N87-15424# Illinois Univ., Urbana. Coordinated Science Lab.
DELAY MODELING OF BIPOLAR ECL/EFL (EMITTER-COUPLED LOGIC/EMITTER-FOLLOWER-LOGIC) CIRCUITS Final Report, Jan. 1985 - Aug. 1986
Andrew T. Yang Aug. 1986 79 p
(Contract N00014-84-C-0149)
(AD-A171131; UILU-ENG-86-2222) Avail: NTIS HC A05/MF A01 CSCL 09/5

This report deals with the development of a delay-time model for timing simulation of large circuits consisting of Bipolar ECL (Emitter-Coupled Logic) and EFL (Emitter-Follower-Logic) networks. This model can provide adequate information on the performance of the circuits with a minimum expenditure of computation time. This goal is achieved by the use of proper circuit transient models on which analytical delay expressions can be derived with accurate results. The delay-model developed in this report is general enough to handle complex digital circuits with multiple inputs or/and multiple levels. The important effects of input slew rate are also included in the model. Author (GRA)

N87-15425# Massachusetts Inst. of Tech., Cambridge. Dept. of Chemistry.
DIGITAL SIMULATION OF THE MEASURED ELECTROCHEMICAL RESPONSE OF REVERSIBLE REDOX COUPLES AT MICROELECTRODE ARRAYS: CONSEQUENCES ARISING FROM CLOSELY SPACED ULTRAMICROELECTRODES Interim Technical Report
Allen J. Bard, Joseph A. Crayston, Gregg P. Kittlesen, Theresa V. Shea, and Mark S. Wrighton 22 Aug. 1986 58 p
(Contract N00014-84-K-0291)
(AD-A171181; TR-8-ONR) Avail: NTIS HC A04/MF A01 CSCL 07/4

Diffusion to arrays of closely spaced (1.2 micrometer to 0.2 micrometer) ultramicroelectrodes (50 micrometers x 2.3 micrometers) was studied by digital simulation and experimentally by examining the redox behavior of Ru(NH3)6(3+) in H2O. Cylindrical diffusion of solution species resulted in quasi-steady-state currents at the microband electrodes. Generation-collection experiments, analogous to rotating ring-disk collection experiments, resulted in larger generator currents than those observed at a single microelectrode due to the back diffusion of products to the neighboring microelectrode. A collection efficiency of 93% was observed for the re-oxidation of Ru(NH3)6(2+) generated at a central microelectrode 0.2 micrometer from two flanking collector microelectrodes. This experiment as well as generator-single collector electrode pairs was simulated at a two-dimensional rectangular expanding grid and yielded results in good agreement with the experiment. Predictions of the model that the collection efficiency principally depends on the gap size, rather than electrode width were tested experimentally. The novel application of microelectrode arrays to the study of the follow-up reactions of electrogenerated intermediates is demonstrated. GRA

N87-15426# Rockwell International Corp., Thousand Oaks, Calif. Microelectronics Research and Development Center.
FUNDAMENTAL ASPECTS OF HETEROJUNCTION BIPOLAR TRANSISTOR TECHNOLOGY Final Report, 15 Jun. 1983 - 30 Jun. 1986
D. L. Miller and P. M. Asbeck Jul. 1986 8 p
(Contract DAAG29-83-C-0020)
(AD-A171225; MRDC41137.7FR; ARO-20454.5-EL) Avail: NTIS HC A02/MF A01 CSCL 09/1

Fundamental aspects of heterojunction bipolar transistor (HBT) technology were investigated, including Be diffusion in MBE growth, the effects of epitaxial structure variations on HBT technology, effects of selected device processing methods on HBT performance, and modelling of HBT devices and ring oscillators. A summary of major results in each of these areas is given, and publications resulting from this contract are listed. Author (GRA)

N87-15427# Massachusetts Inst. of Tech., Cambridge. Dept. of Chemistry.
DIGITAL SIMULATION OF THE MEASURED ELECTROCHEMICAL RESPONSE OF REVERSIBLE REDOX COUPLES AT MICROELECTRODE ARRAYS: CONSEQUENCES ARISING FROM CLOSELY SPACED ULTRAMICROELECTRODES Interim Technical Report
Allen J. Bard, Joseph A. Crayston, Gregg P. Kittlesen, Theresa V. Shea, and Mark S. Wrighton 22 Aug. 1986 61 p
(Contract N00014-85-K-0553)
(AD-A171272; TR-9-ONR) Avail: NTIS HC A04/MF A01 CSCL 09/1

Diffusion to arrays of closely spaced (1.2 micron to 0.2 micron) ultramicroelectrodes (50 micron x 2.3 micron) was studied by digital simulation and experimentally by examining the redox behavior of Ru(NH3)6(3+) in H2O. Cylindrical diffusion of solution species resulted in quasi-steady-state currents at the microband electrodes. Generation-collection experiments, analogous to rotating ring-disk collection experiments, resulted in larger generator currents than those observed at a single microelectrode due to the back diffusion of products to the neighboring microelectrode. A collection efficiency of 93% was observed for the re-oxidation of Ru(NH3)6(2+) generated at a central microelectrode 0.2 micron from two flanking collector microelectrodes. This experiment as well as generator-single collector electrode pairs was simulated at a two-dimensional rectangular expanding grid and yielded results in good agreement with the experiment. Predictions of the model that the collection efficiency principally depends on the gap size, rather than electrode width, were tested experimentally. The novel application of microelectrode arrays to the study of the follow-up reactions of electrogenerated intermediates is demonstrated. Author (GRA)

N87-15428# Department of the Navy, Washington, D. C.
PRINTED CIRCUIT CARD HYBRID Patent
Arnold Flores, inventor (to Navy) Issued 1 Jul. 1986 5 p
Supersedes AD-D010667
(AD-D012448; US-Patent-4,597,631; US-Patent-Appl-SN-446295; US-Patent-Class-350-96.20) Avail: US Patent and Trademark Office CSCL 09/1

A hybrid connector is presented whereby both electrical and fiber optic cables are connected to a printed circuit card. The connector consists of a female half which contains a plurality of fiber optic contact inserts molded into the connector, and also female electrical connections. The male half of the connector is an integral part of a printed circuit card constructed to contain male fiber optical contact inserts in addition to the standard plated electrical male type contact points. Both halves of the connector may be fitted with removable and interchangeable fiber optic contacts, radio frequency contacts, and/or power pins in addition to the standard printed circuit card contacts for wire wrap or solder connections. The printed circuit card hybrid fiber optic connector presented here provides normal card installation and removal of fiber optic interconnects from standard card cages or other boards without threading or other special engaging mechanisms.
Author (GRA)

N87-15429# Department of the Army, Washington, D. C.
CATHODE INCLUDING A NON FLUORINATED LINEAR CHAIN POLYMER AS THE BINDER, METHOD OF MAKING THE CATHODE, AND LITHIUM ELECTROCHEMICAL CELL CONTAINING THE CATHODE Patent Application
Edward J. Plichta, inventor (to Army) and Mark Salomon, inventor (to Army) Filed 7 Aug. 1986 13 p
(AD-D012464; US-Patent-Appl-SN-895015) Avail: NTIS HC A02/MF A01 CSCL 09/1

A cathode suitable for use in a lithium electrochemical cell is made from a mixture of active cathode material, carbon, and non fluorinated linear chain polymer by a method including the following steps: (1) dissolving the non fluorinated linear polymer in a non

polar solvent at a temperature near the melting point of the polymer; (2) adding the active cathode material and carbon and evaporating the solvent; and (3) grinding the dried mixture into a fine powder and making it into a cathode by pressing the powdered mixture onto both sides of an expanded metal screen and then cutting to the desired dimensions. The cathode can be combined with lithium as the anode and a solution of 0.8 mol/cu dm LiAlCl4 in a mixed organic solvent of 24 mass percent 4-butyrolactone in 1, 2 dimethoxyethane as the electrolyte to provide a mechanically stable, relatively inexpensive lithium electrochemical cell having good cell performance. GRA

N87-15430# Naval Surface Weapons Center, Silver Spring, Md.
RESEARCH PROGRAM ON A COMPACT AND HIGH-POWER MICROWAVE TUBE Final Report
W. Namkung, J. Y. Choe, and H. S. Uhm Feb. 1986 42 p
(AD-A171567; NSWC/MP-86-845) Avail: NTIS HC A03/MF A01 CSCL 09/1

A research program on a compact and high-power microwave tube has been initiated for applications to microwave weapons. The proposed microwave tube is a phase-controlled amplifier based on the newly developed cusptron microwave tube concept. The objective of this program is to develop a cusptron amplifier of 5-9 GHz, 80-100 MW, 10 microsec pulse length, and 1-10 kHZ repetition rate. The immediate goal is the construction of a medium power tube of 5-9 GHz, 200-250 KW, 10 microsec pulse length, and 1 KHz repetition rate. The program covers a three year period, CY 86-88. Contents: Description of Proposed Research; Costs and Schedule; Appendices (Reprints): Observation of Microwave Generation from a Cusptron Device; Linear Theory of Cusptron Microwave Tubes; Experimental Results - Cusptron Microwave Tube Study; Design Study of Cusptron Amplifier for Accelerators. GRA

N87-15431# Analytic Services, Inc., Arlington, Va.
PROCEEDINGS OF THE 40TH ANNIVERSARY OF THE JOINT SERVICES ELECTRONICS PROGRAM
Arnold Shostak, ed. 1986 139 p Presented at Research Triangle Park, N.C., 1985
(Contract DAAG29-81-D-0100)
(AD-A171610) Avail: NTIS HC A07/MF A01 CSCL 09/5

The importance and impact of technology ev ·ed as the result of basic and applied research in the various scientific disciplines became most visible in the period when the United States was involved in World War II. Radar, sonar, advanced communications, and identification systems are but a few of the items of warfare introduced and used by our armed forces during that dismal epoch. These systems and their uses were the products of a broad program of intensified study in physics, electronics, mathematics and, indeed, the various disciplines of biological and behavioral sciences. When World War II ended, not only was there the rush by U.S. service personnel to return to their civilian occupations, but in addition, the numerous scientific groups who had volunteered for military research and development service in our country's laboratories were also disbanded. Almost 40 years ago, far-sighted Americans, recognizing the need for a continuation, in some form, of the university/military research program, propelled the establishment of the Joint Services Electronics Program (JSEP), with which this volume is concerned. It is published in comemoration of this Fortieth Anniversary. GRA

N87-15432# Massachusetts Inst. of Tech., Cambridge. Dept. of Chemistry.
PH SENSITIVE WO3-BASED MICROELECTROCHEMICAL TRANSISTORS Interim Technical Report
Michael J. Natan, Thomas E. Mallouk, and Mark S. Wrighton 22 Sep. 1986 39 p
(Contract N00014-84-K-05553)
(AD-A172563; TR-14) Avail: NTIS HC A03/MF A01 CSCL 07/4

Electrochemical properties of an array of closely spaced (1.2 microns) Au or Pt microelectrodes (approx. 2 microns wide x approx. 50 microns long x 0.1 microns high) coated by a 0.15 micron thick layer of polycrystalline WO3 are reported. The WO3 is deposited on the electrode by RF sputtering of a WO3 target. The cyclic voltammetry of these microelectrodes indicates that WO3 connects individual microelectrodes, since the voltammogram of a pair of microelectrodes driven together is indistinguishable from that of an individual microelectrode. WO3 becomes a good conductor upon electrochemical reduction in aqueous solutions. The change in resistance of WO3 connecting two microelectrodes as a function of electrochemical potential spans four orders of magnitude, from approx. 1,000,000 to approx. 100 ohms. A pair of WO3-connected microelectrodes functions as a microelectrochemical transistor that is sensitive to pH. The cyclic voltammetry is pH-dependent and consistent with pH-dependent transistor characteristics, which indicate that the device is turned on at more positive electrochemical potentials in acidic media. In basic solutions, more negative potentials are needed to turn on WO3-based transistors. The maximum slope of the drain current, I sub D, vs. late voltage, V sub G, plot at fixed drain voltage, V sub G, gives a transconductance of 12 mS/mm of gate width. GRA

N87-15433# Frequency Electronics, Inc., Mitchel AFB, N.Y.
HIGH PERFORMANCE CRYSTAL OSCILLATOR DEVELOPMENT Final Report, Aug. 1979 - Feb. 1984
John Ho and Yacine Houari Jul. 1986 44 p
(Contract F19628-80-C-0198)
(AD-A172631; RADC-TR-85-106) Avail: NTIS HC A03/MF A01 CSCL 09/1

This contract calls for design, development, fabrication and test of a fast warm-up crystal oscillator operating at 5 MHz and 10 MHz. Test results of earlier model oscillators indicated that further reductions of inner oven and oscillator assembly mass was required. In addition, an approved method of coupling heat into the crystal blank was worked on. In order to reduce mass, redesign of the electronic circuitry from discrete circuits to IC and Hybrid designs was accomplished. Four hybridized circuits were designed, fabricated and tested: RF Amplifier Hybrid, Colpitts Oscillator Hybrid, Oven Control Hybrid, Pierce Oscillator Hybrid. Two different oscillators, each with SC-cut crystals were designed, built and tested, using RF Amplifier Hybrids, Colpitts Oscillator Hybrids, and Oven Control Hybrids. Excellent results were achieved in short and long term stability, low power, g sensitivity, as well as reduced volume and weight. The Pierce oscillator was also a hybridized design, containing a 5 MHz, 5th overtone crystal. Preliminary test results were also satisfactory. Author (GRA)

N87-15434# Massachusetts Inst. of Tech., Cambridge. Dept. of Chemistry.
AMPLIFICATION OF ELECTRICAL SIGNALS WITH MOLECULE-BASED TRANSISTORS: POWER AMPLIFICATION UP TO A KILOHERTZ FREQUENCY AND FACTORS LIMITING HIGHER FREQUENCY OPERATION Interim Technical Report
Elizabeth P. Lofton, James W. Thackeray, and Mark S. Wrighton 22 Sep. 1986 20 p
(Contract N00014-84-K-0291)
(AD-A172709; TR-12-ONR) Avail: NTIS HC A02/MF A01 CSCL 09/1

Polyaniline- and poly(3-methylthiophene)-based transistors are demonstrated to amplify electrical signals at frequencies exceeding 100 Hz. The amplification of sinusoidal signals to the gate is established by showing the ratio of the average power in the drain circuit to that in the gate circuit exceeds unity. For the devices measured the amplification factor falls to unity between 100 and 1000 Hz. Measurements have been carried out at 298K for the microelectrochemical transistors immersed in aqueous or non-aqueous electrolyte solutions. The transistors consist of a pair of Au (or Pt) microelectrodes (approx. micron long x approx 2 micron wide x approx 0.1 micron high) connected by the redox polymer. The two microelectrodes serve as source and drain and the polymer serves as the channel of the device. GRA

N87-15435# National Bureau of Standards, Washington, D.C. Center for Electronics and Electrical Engineering.
RESEARCH FOR ELECTRIC ENERGY SYSTEMS Annual Report,

Dec. 1985
R. E. Hebner, ed. Mar. 1986 86 p
(DE86-012716; NBSIR-86-3316) Avail: NTIS HC A05/MF A01

Five subtasks are reported on: ac electric and magnetic fields, dc fields and ion measurements, gaseous dielectrics research (SF6 mixtures), interfacial phenomena in liquids, and nanosecond breakdown in power system dielectrics. DOE

N87-15436# Sandia National Labs., Albuquerque, N. Mex.
BASIC EQUATIONS AND SOLUTION METHOD FOR THE CALCULATION OF THE TRANSIENT ELECTROMECHANICAL RESPONSE OF DIELECTRIC DEVICES
S. T. Montgomery and P. F. Chavez Jun. 1986 27 p
(Contract DE-AC04-76DP-00789)
(DE86-012728; SAND-86-0755) Avail: NTIS HC A03/MF A01

A general initial-boundary value problem governing the transient electromechanical response of a class of dielectric devices is developed, and a method for its solution is described. The problem is formulated using the quasistatic electric field approximation and the assumption that the electric displacement of the dielectrics is linear in the electric field. The basic equations and solution method are illustrated with two simple examples. DOE

N87-15437# Massachusetts Inst. of Tech., Cambridge. High Voltage Research Lab.
RESEARCH ON FACTORS THAT AFFECT THE RELIABILITY OF COMPRESSED GAS INSULATED APPARATUS Final Report
C. M. Cook, Z. Liu, A. Rynkowski, and K. Saito Jul. 1986 222 p
(Contract DE-AC05-84OR-21400)
(DE86-014417; ORNL/Sub-80-7979) Avail: NTIS HC A10/MF A01

The reliability of compressed gas insulated apparatus (GIS) is determined by the electrical stresses in the system in relation to inherent strengths of the materials used. Models for gas insulation failure were developed and verified experimentally. Failure was the result of a two-stage process which involves initiation and then propagation sufficient to bridge the high voltage gap. Emphasis was placed on control of parameters and processes so that critical conditions for low voltage, low probability failures could be determined. A probability model for initiation considers the micro-irregularities on electrode surfaces and establishes breakdown probabilities calculating the likelihood of sufficient ionization to meet the streamer criteria. The probability analysis was used to model time to breakdown, electrode area effect, and pressure effect. Studies were made of breakdown initiated by electrode irregularities and metallic particles in the gas and along insulator surfaces. The initiation of flashovers was studied. The role of single particle and multiple controlled particles, showed the main sensitivity to be due to the maximum size field enhancement. The studies on insulator surfaces also included substantial modelling. Static charge transport was carefully investigated and reproducible and consistent results obtained. One conclusion is that electrode surfaces near insulators can greatly affect performance. Major advances in the understanding and prediction of low-probability failures were made as a result of this project. Recommendations concerning the improvement and monitoring of reliability of GIS were made. DOE

N87-15340*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A SINGLE VLSI CHIP FOR COMPUTING SYNDROMES IN THE (225, 223) REED-SOLOMON DECODER
I. S. Hsu, T. K. Truong, H. M. Shao, and L. J. Deutsch *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 98-103 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 09A

N87-15342*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A COMPARISON OF METHODS FOR DPLL LOOP FILTER DESIGN
S. Aguirre, W. J. Hurd, R. Kumar, and J. Statman *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 114-124 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 09A

N87-15360*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SYSTOLIC VLSI FOR KALMAN FILTERS
H.-G. Yeh and J. J. Chang *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 300-306 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 09A

N87-15762# Osaka Univ. (Japan). Lab. for Applied Superconductivity.
APPLICATION OF SUPERCONDUCTING MAGNET ENERGY STORAGE TO POWER SYSTEM STABILIZING CONTROL
Yasunori Mitani, Kiichiro Tsuji, and Yoshishige Murakami *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 305-315 Submitted for publication (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

N87-15763# Osaka Univ. (Japan). Dept. of Electrical Engineering.
EFFECT OF LIGHT-SOAKING ON ELECTRONIC PROPERTIES OF GLOW-DISCHARGED HYDROGENATED AMORPHOUS SILICON
Shunsuke Nagata, Kazuhiro Shirakawa, and Junji Shirafuji *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 317-322 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

N87-15764# Osaka Univ. (Japan). Dept. of Electrical Engineering.
ELECTRICAL CONDUCTIVITY AND CARRIER MOBILITY IN POLYPHENYLACETYLENE AND POLYCHLOROPHENYLACETYLENE AND THEIR DOPING EFFECT
Hal Bon Gu, Shigenori Hayashi, Ryu-ichi Sugimoto, and Katsumi Yoshino *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 323-328 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N87-15438 Brown Univ., Providence, R. I.
SINGLE-SUBSTANCE, TWO-PHASE DUCT FLOW: A UNIFIED THEORETICAL AND EXPERIMENTAL STUDY Ph.D. Thesis
Dimitris Nikitopoulos 1986 227 p
Avail: Univ. Microfilms Order No. DA8617608

A derivation of basic conservation equations for each phase (a two fluid model) is presented. The analysis assumes one-dimensional, steady-state two-phase flow of a single substance in a variable cross-sectional area duct of arbitrary orientation. The equations are used to examine and explain the phenomenon of slip (phases moving at different velocities). A study of choking is carried out and expressions for the critical mass flux in the presence of slip are derived. The effect of compressibility due to phase change (evaporation-condensation) on the flow states and the critical mass flux is investigated. The Mach, Reynolds and Froude numbers are identified as the most important characteristic parameters. Experimental measurements of pressure and temperature change and void fraction for adiabatic vertical flow in a circular duct are presented. The experimental points cover the full range

of the flow from near flashing to choking. The effect of the characteristic parameters on the evolution of the flow is demonstrated on the basis of the experimental results and an estimate of the velocity ratio is obtained for each case examined. The measurements indicate that thermodynamic equilibrium exists in the flow except in the immediate neighborhood of flashing. The pressure evolution is dominated by hydrostatic effects in the initial region after flashing and by high acceleration in the neighborhood of choking. In the intermediate region, vicous, inertial and gravitational effects play a role of equal importance. Dissert. Abstr.

N87-15439 Texas Univ., Austin.
SIMULATION OF TWO-DIMENSIONAL INTERNAL INCOMPRESSIBLE SEPARATED FLOWS WITH HEAT TRANSFER Ph.D. Thesis
Roy Ward Knight 1986 262 p
Avail: Univ. Microfilms Order No. DA8618511

A computer program has been developed which simulates internal flows with recirculating zones in planar and axisymmetric geometries. The boundary layer equations are initially solved to identify the regions of separation, and then the incompressible Navier-Stokes equations, in a stream function-vorticity formulation, are solved for regions of the flow where the boundary layer approximations do not apply. Turbulence closure is via a low-Reynolds number two-equation model of turbulence. The program is verified by calculation of flows for which exact analytic solutions or experimental results are available. Laminar and turbulent attached flow cases considered in the study are fully-developed and developing flows in pipes and channels, with and without heat transfer. The boundary layer equations are shown to yield satisfactory predictions of heat transfer, even in cases involving significant recirculating zones. The numerical technique developed has shown that simulation of complex turbulent flows on mid-size computers is feasible. Dissert. Abstr.

N87-15440 Florida Inst. of Tech., Melbourne.
THE DETAILED MATHEMATICAL PREDICTION OF SIMULTANEOUS HEAT AND MASS TRANSFER IN CAVITIES Ph.D. Thesis
Ali Alp Kerestecioglu 1986 408 p
Avail: Univ. Microfilms Order No. DA8617384

Heat, moisture and momentum transport in closed cavities are greatly affected by the thermal and moisture properties of the bounding walls that strongly influence natural convection within cavities. Natural convection patterns, temperature, moisture and velocity fields are strongly dependent on wall conductivities (thermal and moisture). The propagation and development of these fields are also altered by wall capacitance (thermal and moisture). The computer code FEMALP (Finite Element Method Application Language Program) is developed and then used to study heat, moisture and momentum transport in closed cavities. The computer code is validated against both theoretical data and independently collected experimental data. The governing differential equations for energy, moisture and momentum transfer are solved simultaneously by the code using the finite element method. FEMALP is used to investigate the effects of wall conductivity and capacitance (thermal and moisture) on steady-state and transient temperature, moisture and velocity fields. The effects of intercavity radiation and double-diffusion (temperature and concentration induced buoyancy) on natural convection and flow field stabilization are also explored. For a variety of cases, temperature, moisture and velocity fields for shallow, high aspect ratio and complex cavities are presented. The local and average Nusselt and Sherwood numbers over the interior surfaces of the cavity walls are also reported. Dissert. Abstr.

N87-15441*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TWO- AND THREE-DIMENSIONAL VISCOUS COMPUTATIONS OF A HYPERSONIC INLET FLOW
William G. Kunik, Thomas J. Benson, Wing-Fai Ng (Virginia Polytechnic Inst. and State Univ., Blacksburg), and Arthur Taylor Jan. 1987 17 p Prepared for the 25th Aerospace Sciences Meeting, Reno, Nev., 12-15 Jan. 1987; sponsored by AIAA
(NASA-TM-88923; E-3356; NAS 1.15:88923; AIAA-87-0283) Avail: NTIS HC A02/MF A01 CSCL 20D

The three-dimensional parabolized Navier-Stokes code has been used to investigate the flow through a Mach 7.4 inlet. A two-dimensional parametric study of grid resolution, turbulence modeling and effect of gamma has been done and compared with experimental results. The results show that mesh resolution of the shock waves, real gas effects and turbulence length scaling are very important to get accurate results for hypersonic inlet flows. In addition a three-dimensional calculation of the Mach 7.4 inlet has been done on a straight sideplate configuration. The results show that the glancing shock/boundary layer interaction phenomena causes significant three-dimensional flow in the inlet. Author

N87-15442*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EVALUATION OF SEALS FOR HIGH-PERFORMANCE CRYOGENIC TURBOMACHINES
R. C. Hendricks, L. T. Tam (CHAM of North America, Inc., Huntsville, Ala.), M. J. Braun (Akron Univ., Ohio), and B. L. Vicek (Rensselaer Polytechnic Inst., Troy, N.Y.) 1987 15 p Prepared for presentation at the 17th International Congress of Refrigeration, Vienna, Austria, 24-29 Aug. 1987
(NASA-TM-88919; E-3348; NAS 1.15:88919) Avail: NTIS HC A02/MF A01 CSCL 11A

An approach to computing flow and dynamic characteristics for seals or bearings is discussed. The local average velocity was strongly influenced by inlet and exit effects and fluid injection, which in turn drove zones of secondary flow. For the restricted three-dimensional model considered, the integral averaged results were in reasonable agreement with selected data. Unidirectional pressure measurements alone were insufficient to define such flow variations. However, for seal and bearing leakage correlations the principles of corresponding states were found to be useful. Also discussed are three phenomena encountered during testing of three eccentric nonrotating seal configurations for the Space Shuttle Main Engine (SSME) Program. Fluid injection, choking within a seal, and pressure profile crossover are related to postulated zones of secondary flow or separation and to direct stiffness. Author

N87-15443*# Reddy and Associates, Tullahoma, Tenn.
A LOCALLY IMPLICIT METHOD FOR FLUID FLOW PROBLEMS Final Report. Jul. 1985 - Jul. 1986
K. C. Reddy Nov. 1986 16 p
(Contract NAS8-36648)
(NASA-CR-178989; NAS 1.26:178989) Avail: NTIS HC A02/MF A01 CSCL 20D

The fluid flow inside the space shuttle main engine (SSME) traverses through a complex geometrical configuration. The flow is compressible, viscous, and turbulent with pockets of separated regions. Several computer codes are being developed to solve three dimensional Navier-Stokes equations with different turbulence models for analyzing the SSME internal flow. The locally implicit scheme is a computationally efficient scheme which converges rapidly in multi-grid modes for elliptic problems. It has the promise of providing a rapidly converging algorithm for steady-state viscous flow problems. B.G.

N87-15444*# National Aeronautics and Space Administration, Washington, D.C.
CONSERVATIVE BOUNDARY CONDITIONS FOR 3D GAS DYNAMICS PROBLEMS
B. P. Gerasimov, A. B. Karagichev, and S. A. Semushin Sep. 1986 23 p Transl. into ENGLISH of "Konservativnyye Granichnyye Usloviya dlya Trekhmernykh Gazodinamicheskikh Zadach" Preprint 66 Moscow, USSR, 1986 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-88487; NAS 1.15:88487) Avail: NTIS HC A02/MF A01 CSCL 20D

A method is described for 3D-gas dynamics computer simulation in regions of complicated shape by means of nonadjusted rectangular grids providing unified treatment of various problems. Some test problem computation results are given. Author

N87-15445*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
VORTICAL DISSIPATION IN TWO-DIMENSIONAL SHEAR FLOWS
W. Clifton Horne and Krishnamurty Karamcheti Dec. 1986 23 p
(NASA-TM-89408; A-87018; NAS 1.15:89408) Avail: NTIS HC A02/MF A01 CSCL 20D

An exact expression is derived for the viscous dissipation function of a real homogeneous and isotropic fluid, which has terms associated with the square of vorticity, wave radiation, and dilatation. The implications of the principle of maximal dissipation rate, are explored by means of this equation for a parallel channel flow and a cylindrical vortex flow. The consequences of a condition of maximum dissipation rate on the growth of disturbances in an unsteady, laminar shear layer are apparently consistent with predictions and observations of maximum growth rate of vortical disturbances. Finally, estimates of the magnitudes of several dissipative components of an unsteady vortex flow are obtained from measurements of a periodic wall jet. Author

N87-15446# Tracor Hydronautics, Inc., Laurel, Md.
CLOUD CAVITATION AND COLLECTIVE BUBBLE DYNAMICS Technical Report, Nov. 1983 - 15 Mar. 1986
George L. Chahine, Kenneth M. Kalumuck, and Thomas O. Perdue 15 Mar. 1986 254 p
(Contract N00014-83-C-0244; SR0-2301)
(AD-A170692; TR-83017-1) Avail: NTIS HC A12/MF A01 CSCL 20/4

The study described in this report extends our knowledge of single bubble dynamics to multibubble dynamics. Within the restriction of characteristic bubble size small compared to interbubble distance, the dynamics of a bubble cloud is investigated. Dynamic effects in absence as well as in presence of heat and mass transfer at the bubble wall are considered. The matched asymptotic expansion method is used and enables derivation of differential equations for the bubble shape components at the various orders of approximation. These were solved numerically and the pressure field was deduced. When, during a significant portion of the imposed pressure field history, the liquid is superheated or gas supersaturated, heat and mass transfer at the interface interfere with the dynamics of the bubble growth or oscillations. In that case, the dynamic equation of a bubble in the cloud is coupled to the heat or mass transfer equation by the value of the partial pressures of the liquid vapor and noncondensible gas inside the bubble which are then transfer dependent. This problem is solved when the liquid properties or conditions are such that the variation of the liquid temperature of the gas concentration in the liquid occurs primarily in a thin boundary layer at the bubble wall. In that case an integral equation relates bubble dynamics and heat or mass transfer at the bubble interface. GRA

N87-15447# Dayton Univ., Ohio.
COMPUTATIONAL FLUID DYNAMIC STUDIES OF CERTAIN DUCTED BLUFF-BODY FLOWFIELDS RELEVANT TO TURBOJET COMBUSTORS. VOLUME 2: TIME-AVERAGED FLOWFIELD PREDICTIONS FOR A PROPOSED CENTERBODY COMBUSTOR Final Report, 16 Aug. 1984 - 30 Sep. 1985
M. S. Raju and L. Krishnamurthy Jul. 1986 134 p
(Contract F33615-84-C-2411)
(AD-A171169; UDR-TR-5-83-Vol-2; AFWAL-TR-86-2004-Vol-2) Avail: NTIS HC A07/MF A01 CSCL 21/2

The near-wake region in a ducted bluff-body combustor was investigated by finite-difference computations. The numerical predictions are based upon the time-independent, Reynolds-averaged Navier-Stokes equations and the k-epsilon turbulence model. The steady-state calculations address both nonreacting and reacting flowfields in a novel configuration to more realistically simulate some of the essential features of the primary zone of a gas turbine combustion chamber. This configuration is characterized by turbulent mixing and combustion in the recirculating near-wake region downstream of an axisymmetric bluff body due to two annular air streams--an outer swirl-free flow and an inner swirling flow--and a central fuel jet. The latter contains propane for reacting flows and carbon dioxide for nonreacting flows. In view of the large number of geometrical and flow parameters involved, the reported results are concerned with only a limited parametric examination with the major emphasis being on nonreacting flows. Questions addressed for a particular set of geometric parameters include the effects of variation of mass flow rates in all three streams and the influence of swirl in the middle stream. Reacting computations investigate the influence of swirl on combustion, as well as that of combustion on the flowfield. GRA

N87-15448# Ballistic Research Labs., Aberdeen Proving Ground, Md.
SUPERSONIC FLOW OVER CYLINDRICAL AFTERBODIES WITH BASE BLEED Final Report
Jubaraj Sahu Jun. 1986 31 p
(AD-A171461; AD-F300793; BRL-TR-2742) Avail: NTIS HC A03/MF A01 CSCL 20/4

Computations of supersonic flow over two cylindrical afterbodies have been made using a thin-layer Navier-Stokes base flow code. The capability to compute the base flow with base bleed at supersonic speeds has been developed and used to show the effect of mass injection on the base pressure or base drag. Solutions have been obtained for a projectile and a missile configuration having cylindrical afterbodies. Numerical results show the effect of base bleed on the near wake flow field. The rise in base pressure or reduction in base drag has been clearly predicted for various mass injection rates and comparison with experimental data shows generally good agreement. GRA

N87-15449# Naval Ship Research and Development Center, Bethesda, Md.
AN EXPERIMENTAL INVESTIGATION OF WALL PRESSURE FLUCTUATIONS BENEATH NON-EQUILIBRIUM TURBULENT FLOWS Ph.D. Thesis
Theodore M. Farabee May 1986 254 p
(AD-A171508; DTNSRDC-86/047) Avail: NTIS HC A12/MF A01 CSCL 20/4

Wall pressure fluctuations beneath a non-equilibrium turbulent boundary layer were studied experimentally. The objective of the investigation was to better understand the process by which turbulent boundary layer flows produce wall pressure fluctuations. The approach was to study the statistics of both the wall pressure field and velocity field for a non-equilibrium turbulent boundary layer, produced by passing a flow over a backward-facing step, and then to identify turbulent structures in the flow that contribute to the source terms of the wall pressure field. Detailed velocity and wall pressure measurements were also obtained for an equilibrium flow to provide a basis of comparison for the perturbed flow results. The wall pressure statistics for the perturbed flow are characterized by the presence of the disturbance layer variables. Hence, the source of the low frequency excess in the wall pressure fluctuations is the disturbance layer. The high frequency wall pressures were found to scale on inner variables, and as such, recovered to an equilibrium flow condition quite rapidly. This places the perturbed source of high frequency wall pressures in the inner layer of the boundary layer. GRA

N87-15450# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
NUMERICAL SOLUTION OF LAMINAR AND TURBULENT BOUNDARY LAYER EQUATIONS INCLUDING TRANSITION AND EXPERIMENTAL STUDY OF A FLAT PLATE WITH A BLUNT FIN AT INCIDENCE M.S. Thesis
Alice J. Chen Mar. 1986 340 p
(AD-A172409) Avail: NTIS HC A15/MF A01 CSCL 20/4

This study combines the techniques of computational fluid dynamics and experimentation. An unsteady laminar boundary

layer code was shown to be more efficient when modified to solve the momentum and energy equations using Thomas' algorithm instead of optimized successive over relaxation (SOR). A steady eddy viscosity turbulence model was then added to the code: two models for the inner region, Van Driest and Chapman, and two models for the outer region, a mixing length and Clauser were used. The computer code was verified against theoretical and experimental data from the literature. The code shows excellent results for laminar flow and each of the models showed very good agreement with turbulent experimental data. The experimental study was conducted in a Mach 6 blowdown wind tunnel. Oil flow, sublimation, liquid crystals, and thin film gages were used to examine the flow structure and heat transfer on a flat plate. The heat transfer rates from these gages were lower than from the liquid crystals. The viscid inviscid interaction flow region of flow past a blunt fin mounted on the flat plate was examined using the same flow visualization methods and possible flow interaction models are presented. Striation heating appeared when the fin incidence was 40 deg. and the sweep was 60 or 75 deg. The numerical and experimental techniques of this study were then merged. The heat transfer results from the flat plate experiment were compared with results from the computer code and were found to be in good agreement. Author (GRA)

N87-15451# Wisconsin Univ., Madison.
AN 1 SUP (p) THEORY FOR THE n-DIMENSIONAL, STATIONARY, COMPRESSIBLE, NAVIER-STOKES EQUATIONS, AND THE INCOMPRESSIBLE LIMIT FOR COMPRESSIBLE FLUIDS. THE EQUILIBRIUM SOLUTIONS Technical Summary Report
H. Beiraoda Veiga Jun. 1986 33 p
(Contract DAAG29-80-C-0041)
(AD-A172778; MRC-TSR-2938) Avail: NTIS HC A03/MF A01 CSCL 20/4

This paper studies a system which describes the stationary motion of a given amount of a compressible heat conducting, viscous fluid in a bounded domain omega of R sub n, n is greater than 2. Here u(x) is the velocity field, rho(x) is the density of the fluid, zeta(x) is the absolute temperature, f(x) and h(x) are the assigned external force field and heat sources per unit mass, and p(rho, zeta) is the pressure. In the physically significant case one has g = 0. We prove that for small data (f,g,h) there exists a unique solution (u, rho, zeta) of the problem in a neighborhood of (0, m, zeta sub 0); for arbitrarily large data the stationary solution does not exist in general. Moreover, we prove that (for barotropic flows) the stationary solution of the compressible Navier-Strokes equations, as the Mach number becomes small. Finally the equilibrium solutions for the system is studied. Author (GRA)

N87-15214# Texas Univ., Austin. Dept. of Mechanical Engineering.
ON THE NEED TO BENCHMARK SIMULATION CODES
Michael E. Crawford *In* Von Karman Inst. for Fluid Dynamics Convective Heat Transfer and Film Cooling in Turbo Machinery 1986 39 p (For primary document see N87-15208 07-07)
Avail: NTIS HC A21/MF A01

N87-15215# Texas Univ., Austin. Dept. of Mechanical Engineering.
SIMULATING THE EFFECTS OF CURVATURE, FREE STREAM TURBULENCE, AND TRANSITION
Michael E. Crawford *In* Von Karman Inst. for Fluid Dynamics Convective Heat Transfer and Film Cooling in Turbo Machinery 1986 34 p (For primary document see N87-15208 07-07)
Avail: NTIS HC A21/MF A01

N87-15219# Royal Military Coll. of Science, Shrivenham (England). Dept. of Mechanical Engineering.
HYDRODYNAMICS OF FILM COOLING
A. Brown *In* Von Karman Inst. for Fluid Dynamics Convective Heat Transfer and Film Cooling in Turbo Machinery 1986 55 p (For primary document see N87-15208 07-07)
Avail: NTIS HC A21/MF A01

N87-15866# Institut Atomnoi Energii, Moscow (USSR).
VORTEX AND SPIRAL STRUCTURES IN SHEARED FLOWS
S. V. Bazdenkov, N. M. Morozov, and O. P. Pogutse *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 505-509 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15325# Universite Catholique de Louvain (Belgium). Dept. de Thermodynamique et Turbomachines.
CRITICAL FLOWS
Michel Giot *In* Von Karman Inst. for Fluid Dynamics Two Phase Flows in Major Technological Hazards, Volume 1 1986 31 p (For primary document see N87-15321 07-31)
Avail: NTIS HC A17/MF A01

N87-15755# Osaka Univ. (Japan). Dept. of Applied Physics.
STATISTICAL MECHANICS OF ONE-DIMENSIONAL SYSTEMS. 4: GENERALIZATION OF THE HARD-CORE REPULSION IN MULTICOMPONENT GASES
Kazuyosi Ikeda *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 221-232 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

N87-15771# Osaka Univ. (Japan). Dept. of Environmental Engineering.
NATURAL CONVECTION OF STABLY STRATIFIED FLUID LAYER WITH UNIFORM HEATING FROM BELOW
Akira Yoshikawa, Katsuhito Yamaguchi, Yoshio Inoue, and Hwa Weon Lee *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 379-385 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources and Remote Sensing*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N87-15452*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
GAS PARTICLE RADIATOR Patent Application
Donald L. Chubb, inventor (to NASA) Filed 9 Oct. 1986 8 p
(NASA-Case-LEW-14297-1; NAS 1.71:LEW-14297-1;
US-Patent-Appl-SN-917125) Avail: NTIS HC A02/MF A01 CSCL 82B

A gas particle radiator adapted to operate in a microgravity space environment having a transparent boundary which transmits energy in the infrared spectrum, and a gas particle mixture that yields high absorption and emittances are described. NASA

N87-15453# Wiggins (J. H.) Co., Inc., Long Beach, Calif.
DEVELOPMENT OF INSTRUMENTATION TO MEASURE SOUND SPEED AND FLOW DIRECTION IN DUSTY FLOW FIELDS Technical Report, 1 Oct. 1984 - 30 Sep. 1985
Douglas G. Honegger 11 Nov. 1985 106 p
(Contract DNA001-84-C-0441)
(AD-A171050; Rept-85-1502; DNA-TR-85-369) Avail: NTIS HC A06/MF A01 CSCL 18/4

To support the simulation effort associated with the evaluation of the Hardened Mobile Launcher basing concept, a flow-field instrumentation development program has been undertaken. Specific items targeted for investigation were dusty gas sound

speed and flow orientation within a simulated precursed flow regime. The investigation has included laboratory tests in a small shock tube facility as well as field testing in the MINI SCALE 2 high explosive simulation event. Evaluation of the ultrasonic system has indicated that the use of such a system for monitoring dusty gas sound speed during a high explosive test is achievable. Results from a prototype flow direction gate using a spherical drag body correlated well with pressure records and precursor flow structure observed during high explosive simulation. Recommendations are made for further investigative efforts regarding flow direction measurement. Such measurments allow a means to aid in the evaluation of models, blast-wing measurement devices and quality of the simulator. GRA

N87-15454# Massachusetts Inst. of Tech., Cambridge. Dept. of Chemistry.
MODIFICATION OF MICROELECTRODE ARRAYS: NEW MICROELECTROCHEMICAL DEVICES FOR SENSOR APPLICATIONS Interim Technical Report
Mark S. Wrighton, James W. Thackeray, Michael J. Natan, Diane K. Smith, and Gregg A. Lane 22 Aug. 1986 42 p
(Contract NOOO14-84-K-0291)
(AD-A171180; TR-10-ONR) Avail: NTIS HC A03/MF A01 CSCL 09/1

Microelectrode arrays consisting of two or eight closely spaced (approx. 1 micrometer) Au or Pt microelectrodes (approx. 2 micrometers wide x approx. 50 micrometers long x 0.1 micrometer high) can be modified with a variety of redox active materials in a way that leads to microelectrochemical devices that may be useful as sensors. In general, a pair of microelectrodes connected by a redox active material represents a device, because the current, I sub D, passing from one microelectrode (source) to the other (drain) at a fixed potential between them V sub D, can be modulated by electrically- or chemically-induced changes in the state of charge of the redox material. The fundamental issues associated with pH-sensitive devices based on poly(3-methylthiophene), poly(4-vinylpyridine), a viologen-quinone redox polymer, and WO3 are described to illustrate generic concepts that underlie the development of microelectrochemical sensors. GRA

N87-15455# Lawrence Livermore National Lab., Calif.
NEW APPROACH FOR CALIBRATION AND INTERPRETATION OF IRAD GAGE VIBRATING-WIRE STRESSMETERS
N. Mao May 1986 11 p Presented at the International Symposium on Rock Stress and Rock Stress Measurements, Stockholm, Sweden, 1 Sep. 1986
(Contract W-7405-eng-48)
(DE86-010975; UCRL-93645; CONF-860985-1) Avail: NTIS HC A02/MF A01

IRAD GAGE vibrating-wire stressmeters were installed in the Spent Fuel Facility at the Nevada Test Site to measure the change in in-situ stress during the Spent Fuel Test-Climax (SFT-C). This paper discusses the results of removing a cylindrical section of rock and gages as a unit through overcoring, and the subsequent post-test calibration of the stressmeters in the laboratory. The estimated in-situ stresses based on post test calibration data are quite consistent with those directly measured in nearby holes. The magnitude of stress change calculated from pre-test calibration data is generally much smaller than that estimated from post test calibration data. DOE

N87-15456# Stanford Linear Accelerator Center, Calif.
SLAC PULSED X-RAY FACILITY
N. E. Ipe, R. C. McCall, and E. D. Baker May 1986 8 p Presented at the Health Physics Society Meeting, Pittsburgh, Pa., 30 Jun. 1986
(Contract DE-AC03-76SF-00515)
(DE86-012045; SLAC-PUB-3968; CONF-8606139-4) Avail: NTIS HC A02/MF A01

The Stanford Linear Accelerator Center (SLAC) operates a high energy (up to 33 GeV) linear accelerator delivering pulses up to a few microseconds wide. The pulsed nature of the electron beam creates problems in the detection and measurement of radiation both from the accelerator beam and the klystrons that provide the RF power for the accelerator. Hence, a pulsed X-ray facility has been built at SLAC mainly for the purpose of testing the response of different radiation detection instruments to pulsed radiation fields. The X-ray tube consists of an electron gun with a control grid. This provides a stream of pulsed electrons that can be accelerated towards a confined target-window. The window is made up of aluminum 0.051 cm (20 mils) thick, plated on the vacuum side with a layer of gold 0.0006 cm (1/4 mil) thick. The frequency of electron pulses can be varied by an internal pulser from 60 to 360 pulses per second with pulse widths of 360 ns to 5 ms. The pulse amplitude can be varied over a wide range of currents. An external pulser can be used to obtain other frequencies or special pulse shapes. The voltage across the gun can be varied from 0 to 100 kV. The major part of the X-ray tube is enclosed in a large walk-in-cabinet made of 1.9 cm (3/4 in) plywood and lined with 0.32 cm (1/8 in) lead to make a very versatile facility. DOE

N87-15339*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DSN MICROWAVE ANTENNA HOLOGRAPHY. PART 2: DATA PROCESSING AND DISPLAY OF HIGH-RESOLUTION EFFECTIVE MAPS
D. J. Rochblatt, Y. Rahmat-Samii, and J. H. Mumford *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 92-97 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 14E

N87-15770# Osaka Univ. (Japan). Dept. of Precision Engineering.
NON-REFERENCE ANALYSIS OF ROTATIONAL ACCURACY WITH NANOMETER RESOLUTION ON ULTRAPRECISION SPINDLE
Naoya Ikawa, Shoichi Shimada, Hideyuki Morooka, and Hiroshi Hirano *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 369-378 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

36 LASERS AND MASERS

Includes parametric amplifiers.
For related information see also *76 Solid-State Physics.*

N87-15457# Naval Postgraduate School, Monterey, Calif.
RADIATION PRODUCED BY THE MODULATED ELECTRON BEAM OF A FREE ELECTRON LASER
Fred R. Buskirk, John R. Neighbours, and Xavier K. Maruyama Jun. 1986 23 p
(AD-A171168; NPS-61-86-013) Avail: NTIS HC A02/MF A01 CSCL 20/5

The electron beam in a free electron laser (FEL) becomes axially modulated at the optical wave length of the FEL radiation. This electron beam passed through a gas may produce intense Cerenkov radiation. The effects of the radial and axial dimension of the electron bunches on the radiation are explored. GRA

N87-15458# Arizona Univ., Tucson. Optical Sciences Center.
THEORETICAL STUDIES IN FREE-ELECTRON LASERS Final Report, Aug. 1981 - Jun. 1986
Murray Sargent, III and F. A. Hopf 15 Aug. 1986 10 p
(Contract N00014-81-K-0754)
(AD-A171174) Avail: NTIS HC A02/MF A01 CSCL 20/10

This contract covered: (1) nonlinear multiwave mixing, and (2) theoretical studies relevant to free-electron lasers. Over the course of the years, the first part received more attention and, recently, a correspondingly larger portion of the funding. Both parts are summarized and a list is provided of papers resulting from this contract. GRA

N87-15459# Naval Research Lab., Washington, D. C.
LINEAR AND NONLINEAR THEORY OF THE DOPPLER-SHIFTED CYCLOTRON RESONANCE MASER BASED ON TE AND TM WAVEGUIDE MODES Memorandum Report, Jan. 1985 - Mar. 1986
Arne W. Fliflet 29 Aug. 1986 66 p
(AD-A172231; NRL-MR-5812) Avail: NTIS HC A04/MF A01 CSCL 20/5

This paper presents a comprehensive theory of the Cyclotron Resonance Maser (CRM) interaction in a circular waveguide. The kinetic theory is used to drive the dispersion relationships for both TE and TM modes. The TE mode case has been investigated by several authors, but there has been comparatively little work on the TM mode case. However, the TM mode interaction competes effectively with the TE mode interaction at relativistic electron energies. The conditions for maximum temporal and spatial growth rates are shown. The TM mode growth rates are found to vanish when the RF wave group velocity equals the beam axial velocity (grazing incidence). The single particle theory is used to derive a compact set of self consistent nonlinear equations for the TE and TM mode interactions. These equations are particularly appropriate for the Cyclotron Auto Resonance Maser (CARM) regime but applicability extends to other regimes as well. The conditions for optimum efficiency are investigated for oscillator and amplifier configurations at the fundamental and low order harmonic interactions. In the case of a beam with delta function distributions in position and momentum the single particle results in the small signal limit are shown to be equivalent to the kinetic theory results. Design parameters are given for high power amplifier and oscillator configurations. GRA

N87-15460# Hampton Inst., Va. Dept. of Physics.
INTENSE EXCITATION SOURCE OF BLUE-GREEN LASER Annual Summary Report, 1 Oct. 1985 - 30 Sep. 1986
Kwang S. Han 6 Oct. 1986 14 p
(Contract N00014-80-C-0957; RR0-1109)
(AD-A172660) Avail: NTIS HC A02/MF A01 CSCL 20/5

An intense and efficient source for blue green laser useful for the space-based satellite laser applications, underwater strategic communication, and measurement of ocean bottom profile is being developed. The source in use, the hypocycloidal pinch plasma (HCP), and the dense plasma focus (DPF) can produce intense uv photons (200 to 400nm) which match the absorption spectra of both near UV and blue green dye lasers (300 to 400nm). As a result of optimization of the DPF light at 355nm, the blue green dye (LD490) laser output exceeding 4mJ was obtained at the best cavity tunning of the laser system. With the HCP pumped system a significant enhancement of the blue green laser outputs with dye LD490 and coumarin 503 has been achieved through the spectrum conversion of the pumping light by mixing a converter dye BBQ. The maximum increase of laser output with the dye mixture of LD490+BBQ and coumarin 503+BBQ was greater than 80%. In addition, the untunned near UV lasers were also obtained. The near UV laser output energy of P-terphenyl dye was 0.5mJ at lambda sub C=337nm with the bandwidth of 3n m for the pulse duration of 0.2us. Another near UV laser output energy obtained with BBQ dye was 25 mJ at lambda sub C=383nm with the bandwidth of 3nm for the pulse duration of 0.2us. Another near UV laser output energy obtained with BBQ dye was 25 mJ at lambda sub C=383nm with the bandwidth of 3nm for the pulse duration of 0.2microsec. GRA

N87-15461# Ortel Corp., Alhambra, Calif.
SELF-INDUCED FREQUENCY SCANNING AND DISTRIBUTED BRAGG REFLECTION IN SEMICONDUCTOR LASERS WITH PHASE-CONJUGATE FEEDBACK
Mark Cronin-Golomb and Amnon Yariv Jul. 1986 4 p
(Contract DAAG29-84-C-0028)
(AD-A172933; ARO-22541.11-PH) Avail: NTIS HC A02/MF A01 CSCL 20/6

A GaAlAs semiconductor laser with feedback from a barium titanate photorefractive ring passive phase-conjugate mirror can be made to perform repeating or nonrepeating frequency scans over a 10-nm range toward either the blue or the red. The direction of scanning and whether the scans repeat may be controlled by adjusting the overlap of the interaction beams in the crystal. This overlap region may be adjusted so that the diode frequency spectrum, originally occupying about 10 longitudinal modes, scans and narrows as the conjugate signal builds up, coming to rest often in one, but sometimes two or three, longitudinal modes as a result of self-generated distributed-feedback effects. We also report similar effects caused by feedback from the total-internal-reflection passive phase-conjugate mirror. The alignment-control mechanism of the ring mirror is, however, not available in this case. GRA

N87-15462# Toronto Univ., Downsview (Ontario). Inst. for Aerospace Studies.
THE APPLICATION OF LASER SATURATION TO THE EFFICIENT GENERATION OF SHORT WAVELENGTH RADIATION FROM PLASMAS Final Report, 1 Nov. 1984 - 31 Oct. 1985
R. M. Measures May 1986 136 p
(Grant AF-AFOSR-0020-85)
(AD-A172945; AFOSR-86-0906TR) Avail: NTIS HC A07/MF A01 CSCL 20/5

Resonant laser pumping of transitions within atoms or ions represents a powerful mode of coupling laser energy into a gas or plasma. In the case of laser saturation of a resonance transition rapid heating of the free electrons by superelastic collision quenching of the laser pumped state has been shown to play the central role in this process. A computer code has been developed which models this laser ionization based on resonance saturation (LIBORS) and permits mapping of the three dimensional nature of this complex interaction. It is shown by comparison with experiment that this LIBORS computer code can predict the radial and axial electron density and temperature profiles of the plasma formed along the path of the laser pulse. These experimental results in themselves represent the first detailed measurements of a sodium plasma created by laser resonance saturation and reveal the importance of laser attenuation in the formation of the plasma. It is also shown that both one and two photon resonant laser pumping of a cold, unexcited plasma created by two photon ionization of strontium vapor can lead to rapid excitation of high lying states of the strontuim ion. Lastly, parametric generation within this same strontium plasma has been demonstrated when the laser is tuned close to a two photon transition of the ion. GRA

N87-15463# Ballistic Research Labs., Aberdeen Proving Ground, Md.
PHOTOCHEMICAL IGNITION STUDIES. PART 2: OXYGEN-ATOM 2-PHOTON RESONANCE EFFECTS Final Report
Brad E. Forch and Andrzej W. Miziolek Jun. 1986 22 p
(AD-A172974; BRL-TR-2740) Avail: NTIS HC A02/MF A01 CSCL 21/2

Ultraviolet lasers have recently been used to activate and ignite reactive gas mixtures through multiphoton photochemical means. This new phenomenon makes it possible to use UV lasers as primary ignition or ignition augmentation sources for igniting propellants or their pyrolysis products. The first report in this series describes the ignition of hydrocarbon/air, N2O mixtures by the excimer laser lines KrF (248 nm) and ArF (193 nm). In this report, a sharp wavelength dependence on the amount of incident laser energy necessary to ignite a premixed flow of H2/O2 at atmospheric pressure is described. This wavelength dependence exhibits a spectral profile similar to the two-photon fluorescence excitation curve for flame oxygen atoms and the respective peaks correspond to exactly the same wavelength near 225.6 nm. This similarity clearly indicates that oxygen atom production and subsequent excitation is an important step in the efficient (ca. 0.5 mJ) laser ignition of H2/O2 flows in this wavelength region. In addition, the dependence of the incident laser energy on the equivalence ratio reveals that the most efficient ignition occurs far into the fuel-lean region. This behavior further underscores the importance of the interaction between the UV laser and the oxidizer (O2) component in the ignition of this reactive mixture. GRA

N87-15346*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
BLOCK 2A TRAVELING-WAVE MASER
D. L. Trowbridge *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 158-164 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 20E

N87-15767# Osaka Univ. (Japan). Course of Electromagnetic Energy Engineering.
HARMONC CONVERSION OF GEKKO 12 HIGH-POWER Nd: GLASS LASER
Yoshio Hirose, Tadashi Kanabe, Masahiro Nakatsuka, and Chiyoe Yamanaka *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 345-351 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

N87-15768# Osaka Univ. (Japan). Course of Electromagnetic Energy Engineering.
COPPER VAPOR LASERS FOR ISOTOPE SEPARATION
Chihiro Yamanaka, Etsuo Fujiwara, Toshihiro Naka, Tetsuya Takeda, Tatsuhiko Yamanaka, and Chiyoe Yamanaka *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 353-359 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

N87-15769# Osaka Univ. (Japan). Course of Electromagnetic Energy Engineering.
DEVELOPMENT OF A SINGLE-MODE DYE LASER PUMPED BY A COPPER VAPOR LASER
Yasushi Arai, Hideaki Niki, Satoru Adachi, Tetsuya Takeda, Tatsuhiko Yamanaka, and Chiyoe Yamanaka *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 361-367 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

N87-15838# Nice Univ. (France). Lab. de Physique de Matiere Condensee.
TIME DEPENDENT BEHAVIOR OF INTERSTELLAR MASER FEATURES DUE TO STIMULATED SCATTERING THROUGH DENSE PLASMA CLOUDS
C. Montes *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 325-330 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

37 MECHANICAL ENGINEERING

Includes auxiliary systems (nonpower); machine elements and processes; and mechanical equipment.

N87-15464*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
COMPOSITE PISTON Patent Application
Allan H. Taylor, inventor (to NASA) Filed 30 Jul. 1986 17 p
(NASA-Case-LAR-13435-1; NAS 1.71:LAR-13435-1; US-Patent-Appl-SN-890683) Avail: NTIS HC A02/MF A01 CSCL 94O

A composite piston structure is disclosed which provides a simple and reliable means for joining a carbon-carbon or ceramic piston cap with a metallic piston body. Attachment is achieved by means of a special geometry which compensates for differences in thermal expansion without complicated mechanical fastening devices. The shape employs a flange created by opposed frustoconical shapes with coincident vertices intersecting on the radial centerline of the piston in order to retain the piston cap. The use of carbon-carbon for the piston cap material allows a close fit between the piston and a cylinder wall, eliminating the need for piston rings. The elimination of extra mechanical parts of previous composite pistons provides a lightweight composite piston capable of extended high temperature operation. NASA

N87-15465*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
INFUSION EXTRACTOR Patent Application
Franklin R. Chang-Diaz, inventor (to NASA) Filed 30 Sep. 1986 15 p
(NASA-Case-MSC-20761-1; NAS 1.71:MSC-20761-1; US-Patent-Appl-SN-913446) Avail: NTIS HC A02/MF A01 CSCL 13I

This invention relates to an apparatus and method of removing desirable constituents from an infusible material by infusion extraction. A piston operating in a first chamber draws a solvent into the first chamber where it may be heated, and then moves the heated solvent into a second chamber containing the infusible material, where infusion extraction takes place. The piston then moves the solvent containing the extract through a filter into the first chamber, leaving the extraction residue in the second chamber. The method is applicable to operation in low or micro-gravity environments. NASA

N87-15466*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
NEW GENERATION METHODS FOR SPUR, HELICAL, AND SPIRAL-BEVEL GEARS
F. L. Litvin (Illinois Univ., Chicago), W.-J. Tsung, J. J. Coy (Army Aviation Research and Technology Activity, Cleveland, Ohio), R. F. Handschuh, and C.-B. P. Tsay (National Chiao Tung Univ., Hsinchu Taiwan) Nov. 1986 26 p Presented at the Rotary Wing Propulsion System Specialist Meeting, Williamsburg, Va., 12-14 Nov. 1986; sponsored by American Helicopter Society
(NASA-TM-88862; E-3216; NAS 1.15:88862; USAAVSCOM-TR-86-C-27) Avail: NTIS HC A03/MF A01 CSCL 13I

New methods for generating spur, helical, and spiral-bevel gears are proposed. These methods provide the gears with conjugate gear tooth surfaces, localized bearing contact, and reduced sensitivity to gear misalignment. Computer programs have been developed for simulating gear meshing and bearing contact. Author

N87-15467*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
LUBRICANT EFFECTS ON BEARING LIFE
Erwin V. Zaretsky Dec. 1986 22 p Presented at the OEM Design Conference, New York, N.Y., 9-11 Dec. 1986
(NASA-TM-88875; E-3253; NAS 1.15:88875) Avail: NTIS HC A02/MF A01 CSCL 11H

Lubricant considerations for rolling-element bearings have within the last two decades taken on added importance in the design and operation of mechanical systems. The phenomenon which limits the useful life of bearings is rolling-element or surface pitting fatigue. The elastohydrodynamic (EHD) film thickness which separates the ball or roller surface from those of the raceways of the bearing directly affects bearing life. Chemical additives added to the lubricant can also significantly affect bearings life and reliability. The interaction of these physical and chemical effects is important to the design engineer and user of these systems. Design methods and lubricant selection for rolling-element bearings are presented and discussed. Author

N87-15468# Technische Hochschule, Aachen (West Germany). Lehrstuhl fuer Angewandte Thermodynamik und Inst. fuer Thermodynamik.
AUTOMOTIVE SPARK-IGNITION ENGINE IN A NEW EUROPEAN CONTEXT. PROCEEDINGS
1985 495 p Conference held in Aachen-Eurogress (West Germany), 23-25 Oct. 1985
(DE86-753253; CONF-8510367) Avail: NTIS HC A21/MF A01

A negative side-effect of the increasing energy consumption is the emissions problem. As far as the motor car as a source of emissions is concerned, in recent years these emissions have

been gradually reduced in accordance with European guidelines more than is the case with all other emittants. Far stricter exhaust legislation than in Europe applies in the USA. It can be complied with using the concept of the controlled catalyst, although this has the disadvantage of involving greater technical resources and increased fuel consumption. When in the summer of 1983 the Federal German government demanded the application of these stricter US limits, the other EEC countries were not at all keen to follow this suggestion because they felt the high cost of rectifying what was only an assumed cause of damage to be unjustified. The automotive industry has always seen it as a matter of priority on the one hand to find a pan-European solution and on the other to take swiftly effective measures. In line with this objective, in June 1985 the necessary laws were passed. Limits staggered chronologically and by engine capacity, together with incentives for early compliance and service installations, will ensure that the motor car as a source of emissions ceases to figure in the current political debate. Author

N87-15469# Sandia National Labs., Albuquerque, N. Mex.
CONTROL AND SIMULATION OF A 3-JOINTED FINGER
Victor J. Johnson, Clifford S. Loucks, Gregory P. Starr (New Mexico Univ., Albuquerque), and John P. H. Steele 1986 9 p
(DE86-014303; SAND-86-1846C) Avail: NTIS HC A02/MF A01

Improved dexterity is an area of current research in robotics. Some of the issues raised in studying the characteristics and control of a single finger of the dexterous hand are discussed. The issues are dynamic modelling, a friction model and its influence on joint control, and several approaches to controlling the hand including a model-based approach to decouple the joint dynamics and reduce the nonlinear frictional effects. A method for control is discussed. Author

N87-15470# Sussex Univ., Brighton (England).
IDENTIFICATION OF DAMPING PARAMETERS OF A SQUEEZE-FILM BEARING Final Technical Report, Oct. 1984 - Oct. 1985
J. B. Roberts May 1986 55 p
(Contracts DAJA45-84-C-0044; DA Proj. 1L1-61102-BH-37)
(AD-A169678) Avail: NTIS HC A04/MF A01 CSCL 20/11

Determination of the damping and inertial coefficients of a squeeze-film bearing, and the dependence of these coefficients on eccentricity ratio and frequency of vibration were studied. Experimental results were obtained from a rig in which the squeeze-film journal is mounted on a beam of continuously variable length. By means of a transient test technique, combined with signal processing based on a parametric identification method, estimates of the damping and inertial coefficients obtained for static eccentricity ratios in the range 0.0 to 0.5, and for vibration frequencies ranging from 50 Hz to 180 Hz. These coefficients are, in general, much higher in value than conventional short-bearing theory for squeeze-film bearings predicts (by a factor of 10 in some cases) suggesting serious inadequacies in available theoretical prediction. Numerical theoretical predictions of these coefficients were obtained for finite-length bearings, with various L/D rations (where L is the length of one bearing land, and D the bearing diameter). GRA

N87-15471# Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
END-POINT CONTROL OF FLEXIBLE MANIPULATORS Final Report, 1 Sep. 1984 - 30 Aug. 1985
Robert H. Cannon and Thomas O. Binford Sep. 1986 129 p
(Contract F33615-82-K-5108)
(AD-A172287; AFWAL-TR-86-4051) Avail: NTIS HC A07/MF A01 CSCL 05/8

An experimental system was built around a dextrous three finger hand, sensors, computer interfaces, and control system. The hand enables generic motions: stable grasping, delicate force control, fine motion and repositioning of objects. An initial analysis of force control was implemented in a hierarchial control system. Generic task operations were decomposed into generic motions of objects, elemental rotations and translations. These elemental motions form a complete set which will be implemented in course of research. Using a very flexible manipulator arm, we have accomplished rapid slew and touch, without pause, into a moving target. We have established the absolute physical limits on slew velocity and control speed, and have achieved performance near these limits; and we have demonstrated smooth switching through end point position control and end point force control. To do this we developed both a simple end point force sensor and an optical position sensing system for both the end point of the manipulator and the target. Next, using the flexible arm with a fast attached wrist we have also demonstrated fast slew and touch, and have shown that the high speed wrist control makes possible quite exquisite control of the force at the fingertip; despite rapid speed of contact, force level can be maintained precisely at the specified value, without force overshoot. Author (GRA)

N87-15472# Fabrica Italiana Apparecchi Radio S.p.A., Milan.
ROBOT SYSTEM FOR DEXTEROUS TASKS (FOR SPACE APPLICATIONS)
Piergiovanni Magnani 1986 16 p
(ETN-86-98562) Avail: NTIS HC A02/MF A01

A robot system for dexterous tasks in space applications, which can be mounted on a moving frame, to be brought to the working area (by the moving frame) and then perform a given envelop of tasks, is discussed. The moving frame can be a service manipulator arm (for external space applications) or a moving guide (for internal applications). ESA

N87-15347*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ANTENNA SERVO CONTROL SYSTEM CHARACTERIZATION: RATE LOOP ANALYSIS FOR 34-m ANTENNA AT DSS 15
J. A. Nickerson, D. G. Cox, H. K. Smith, J. H. Engel, and H. G. Ahlstrom *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 165-173 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 13I

N87-15759# Osaka Univ. (Japan). Dept. of Welding Engineering.
REAL TIME OPTIMIZATION OF THIN PLATE TIG ARC WELDING
Takayoshi Ohji, Kimiyuki Nishiguchi, and Yasuhiko Yoshida *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 267-273 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N87-15473# Oak Ridge National Lab., Tenn. Environmental Sciences Div.
QUALITY ASSURANCE METHODS MANUAL FOR EXPERIMENTAL DESIGN AND DATA MANAGEMENT
Charles F. Baes, III, Richard J. Olson, and Kurt Riitters Jul. 1986 51 p
(Contract DE-AC05-84OR-21400)
(DE86-015180; CONF-8603151-1) Avail: NTIS HC A04/MF A01

The Forest Response Program (FRP) is directed at defining the current relationship between forest condition and atmospheric pollutants, monitoring changes in forest conditions, developing and testing hypotheses to explain the observed changes, and predicting future changes in forest conditions. This research program is performed within four Research Cooperatives (Spruce/Fir, Southern Commercial Forest, Western Conifers, and Eastern Hardwood) and two research support cooperatives (National Vegetation Survey and Deposition Monitoring Support Program). Three areas are studied: the occurence and extent of forest damage; causal

relationships and mechanisms of damage; and dose-related relationships. B.G.

N87-15474# SRI International Corp., Menlo Park, Calif.
ELECTROMAGNETIC SENSOR ARRAYS FOR NONDESTRUCTIVE EVALUATION AND ROBOT CONTROL Annual Technical Report, 1 Sep. 1984 - 31 Aug. 1985
A. J. Bahr and A. Rosengreen 31 Oct. 1985 28 p
(Contract F49620-84-K-0011)
(AD-A171126; AFOSR-86-0511TR; ATR-1) Avail: NTIS HC A03/MF A01 CSCL 14/2

The objective of this research program is to develop the theoretical models, design methodology, and technology needed for optimum application of near field electromagnetic sensor arrays in nondestructive evaluation (NDE) and robot control. To aid in understanding how best to analyze and control the spatial-frequency content in the field configuration generated by an array, most of this year's effort focused on obtaining experimental measurements of the relative spatial distributions defined by the responses of inductive eddy current reflection probes to surface steps and surface breaking rectangular slots in aluminum plates. In particular, a commercial reflection probe (Nortec SPO-2065) and an SRI-constructed, five coil, air core reflection probe have been used to interrogate such surface discontinuities. The data obtained using the five coil probe compare favorably with the results of the developed theory. GRA

N87-15475# Kentucky Univ., Lexington. Research Lab.
SIGNAL PROCESSING IN ULTRASONIC NDE (NONDESTRUCTIVE EVALUATION) Final Technical Report, 15 Aug. 1984 - 14 Nov. 1985
Pramode K. Bhagat and Benjamin J. Leon 24 Jul. 1986 47 p
(Grant AF-AFOSR-0223-84)
(AD-A172687; AFOSR-86-0904TR) Avail: NTIS HC A03/MF A01 CSCL 14/2

The desirable performance goal of an ultrasonic nondestructive evaluation, NDE, methodology is to reliably and rapidly obtain information regarding flaws in the material being tested. Decisions concerning acceptance/rejection of material for further usage can then be made on the basis of the nature and severity of flaws within it. Flaw size estimates are currently made on the basis of an idealized physical model, describing the flaw, which uses the computed impulse response as an input. The research reported in this study seeks to define the limits and sensitivities of currently available deconvolution algorithms. In particular, the interrelationship among parameters of deconvolution procedures, noise, transducer bandwidth and instrumentation related errors were studied. Simulation experiments dealing with the impulse train recovery from material samples are illustrated in an algorithmic manner with the aid of a laboratory minicomputer system. Author (GRA)

N87-15486# Koninklijke Militaire Academie (Netherlands).
NONDESTRUCTIVE METHODS FOR THE INSPECTION OF CREEP-LOADED INSTALLATIONS [NDO-METHODEN VOOR INSPECTIE VAN OP KRUIP BELASTE INSTALLATIES]
L. A. J. Sarton *In* Nederlands Inst. voor Lastechniek Residual Life. Information Day of the Dutch Institute of Welding Techniques 1986 p 77-81 In DUTCH (For primary document see N87-15479 07-39)
Avail: NTIS HC A06/MF A01

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N87-15476 Carnegie-Mellon Univ., Pittsburgh, Pa.
FEM MODEL OF 3D TRANSIENT TEMPERATURE AND STRESS FIELDS IN WELDED PLATES Ph.D. Thesis
Sandra Zeiler Newman 1986 139 p
Avail: Univ. Microfilms Order No. DA8616515

A new numerical thermomechanical model of the region in and near a shallow weld in a thick plate is presented. The proposed thermal and structural model of the welding process is axisymmetric, with the axis of symmetry in the welding direction. The geometry of the near-weld region is modeled as a hollow cylinder with small inner radius calculated from welding parameters and outer radius equal to the plate thickness. The effective heat input by the arc, calculated from welding parameters in the usual way, is deposited over a finite region at the inner radius. The new thermal model of a nonstationary temperature field considers arc start and stop effects, permits variable arc velocity, models short (and long) welds, and includes conduction of heat in the welding direction. The new mechanical model of a general axisymmetric state of stress considers end effects, includes the effect of thermal gradients in the welding direction, models short (and long) welds, and allows sections perpendicular to the weld to have non-zero, and non-planar, deformation. Results of thermal and structural finite element analyses are presented for typical welding parameters and plate dimensions. The material chosen to illustrate the model is aluminum. Dissert. Abstr.

N87-15477 Brown Univ., Providence, R. I.
SHEAR LOCALIZATION IN RATE AND TEMPERATURE DEPENDENT SOLIDS Ph.D. Thesis
Jeffrey LeMonds 1986 193 p
Avail: Univ. Microfilms Order No. DA8617592

The formation of narrow bands of intense shear deformation is frequently observed when a solid is deformed sufficiently far into the plastic range. The material properties which play an important role in the localization process include thermal softening, strain hardening, strain rate sensitivity, heat conduction, and flow potential surface curvature. The effects of these properties and the imposed strain rate on the development of localization in a block of material deforming in plane strain compression are examined. The momentum and energy balance equations are solved simultaneously. Analyses are performed using a theory of viscoplasticity which, in the rate independent limit, corresponds to J sub 2 flow theory with combined isotropic and kinematic hardening. The response of the thermomechanical system is coupled by the temperature-dependent flow stress and the internal heat generation resulting from plastic deformation. Two approaches to the localization problem are undertaken. First, the finite element method is used to compute the deformation, stress and temperature fields in a block of material containing a doubly periodic array of internal inhomogeneities. Second, a flow localization method which incorporates the effects of heat conduction is used to predict the onset of shear localization in a solid which contains a narrow planar imperfection. Dissert. Abstr.

N87-15478# Royal Aircraft Establishment, Farnborough (England).
FATIGUE CRACK PROPAGATION AND FRACTURE TOUGHNESS OF PLASMA ARC WELDED Ti-6Al-4V ALLOY
T. S. Baker Jul. 1985 23 p
(RAE-TR-85066; RAE-Mat/Struct-136; BR98308; ETN-86-98374)
Avail: NTIS Avail: NTIS HC A02/MF A01

Tensile, fracture toughness, and fatigue crack propagation (FCP) data for a plasma arc weld (PAW) in 4mm thick Ti-6Al-4V alloy sheet were determined. In addition, FCP data for a weld in 9.6mm thick Ti-6Al-4V alloy produced by a PAW root weld and TIG filler runs is reported. In all of the test pieces the stressing direction was normal to the welding direction. Fractures of across-weld test pieces occur in parent metal, the tensile strength of welded sheet is comparable with that of unwelded parent sheet. The fracture toughness of the welds is lower than that of the parent metal due to the hard martensitic microstructure produced in the fusion zone as a result of the high post-weld cooling rates. The FCP rates, for a given delta K, are slower in all the welded test pieces compared with parent material by factors of 5 to 15 for the 4mm thick sheet, and 3 to 7 the 9.6mm thick material. ESA

N87-15479# Nederlands Inst. voor Lastechniek, 's-Gravenhage.
RESIDUAL LIFE. INFORMATION DAY OF THE DUTCH INSTITUTE OF WELDING TECHNIQUES [RESTLEVENSDUUR. VOORLICHTINGSDAG]
1986 113 p Partly in DUTCH and ENGLISH Presented in 's-Gravenhage, Netherlands, 3 Jun. 1986
(ETN-87-98730) Avail: NTIS HC A06/MF A01

The residual life of creep-loaded installations is introduced. The assessment of creep-loaded components is discussed. Stress and strain analysis techniques and their applicability to determine the residual life were tested. The replica technique is presented as an inspection method for creep damage in high temperature installations. Structure as a criterion for high temperature ductility is discussed. Nondestructive methods for the inspection of creep-loaded installations and short-term creep test methods to determine the residual life of creep-loaded components are presented. Crack initiation and propagation under creep conditions, and the application to fracture mechanics are examined. For individual titles, see N87-15480 through N87-15489.

N87-15480# Nederlands Inst. voor Lastechniek, 's-Gravenhage.
INTRODUCTION TO THE DUTCH WELDING INSTITUTE PROJECT (RESIDUAL) LIFE [INLEIDING OVER HET NIL-PROJECT (REST)LEVENSDUUR]
G. H. G. Vaessen *In its* Residual Life. Information Day of the Dutch Institute of Welding Techniques 1986 p 7-9 In DUTCH (For primary document see N87-15479 07-39)
Avail: NTIS HC A06/MF A01

Research on the residual life of creep-loaded installations in the petrochemical and energy industries is described. Exposure experiments in the laboratory and in the bypass of high pressure steam pipes, and residual life evaluation of industrial installations after prolonged operation are outlined. ESA

N87-15481# Ministerie van Onderwijs en Wetenschappen, Groningen (Netherlands). Dienst voor het Stoomwezen.
ASSESSMENT OF CREEP LOADED HIGH TEMPERATURE INSTALLATIONS [BEOORDELING VAN OP KRUIP BELASTE HOGE TEMPERATUUR INSTALLATIES]
M. Kornalijnslijper *In* Nederlands Inst. voor Lastechniek Residual Life. Information Day of the Dutch Institute of Welding Techniques 1986 p 11-34 Partly in DUTCH and ENGLISH (For primary document see N87-15479 07-39)
Avail: NTIS HC A06/MF A01

Problems occurring during the assessment of creep-loaded components were studied to improve the evaluation procedures for newly built installations, as well as during the operation phase. The evaluation of new installations contains materials behavior, operating conditions, calculation methods, and construction behavior. The results of the evaluation determine the design optimizations aiming at the avoidance of premature very localized damage which threatens the integrity of a component. For the periodic reassessment, valuable information is given about the possibilities and impossibilities of destructive and nondestructive tests, theoretical damage calculations, and evaluation procedures. Rules for pressure vessels concerning the periodic inspection of parts in the creep range, the surface examination procedure, and the microstructure examination procedure are given. ESA

N87-15482# Metaalinstituut TNO, Hengelo (Netherlands). Stichting Geavanceerde Metaalkunde.
EXPERIMENTAL PROGRAM [EXPERIMENTEEL PROGRAMMA]
W. Dortland *In* Nederlands Inst. voor Lastechniek Residual Life. Information Day of the Dutch Institute of Welding Techniques 1986 p 35-49 In DUTCH (For primary document see N87-15479 07-39)
Avail: NTIS HC A06/MF A01

The exposure of components in a pressure vessel during 18,000 hr at 525 C is described. The investigation of the components consists of a visual control, geometric measurements, replica studies, magnetic crack examination, and sampling. The characterization of materials using destructive tests, such as Charpy impact test, tensile tests, long term creep tests, and structural examination is summarized. Fracture times are at least equal to the calculated minimum value. A degraded structure is found at operation temperature of at least 515 C. A reliable prediction of the residual creep strength of the unperturbed material is possible. Reduction factors for welding connections were obtained. ESA

N87-15483# Netherlands Energy Research Foundation, Petten.
ANALYSES OF STRESSES AND STRAINS [ANALYSES VAN SPANNINGEN EN REKKEN]
J. Prij and J. vanderEikhoff (Instituut TNO voor Werktuigkundige Constructies, Delft, Netherlands) *In* Nederlands Inst. voor Lastechniek Residual Life. Information Day of the Dutch Institute of Welding Techniques 1986 p 51-61 In DUTCH (For primary document see N87-15479 07-39)
Avail: NTIS HC A06/MF A01

Stress and strain (including creep strain) analysis techniques to determine the (residual) life of a creep-loaded construction were tested. Analyses prove to be a reliable aid to localize extreme creep damage. The importance of creep damage of a construction can only be accurately calculated using a precise constitutive model. The differences in creep behavior of the different loadings are larger than the difference between the results of measurement and calculation. ESA

N87-15484# Metaalinstitut TNO, Apeldoorn (Netherlands).
REPLICAS AND STRUCTURAL ANALYSIS: CRITERIA FOR THE RELIABILITY OF CREEP-LOADED INSTALLATIONS [REPLICA'S EN STRUCTUURONDERZOEK: CRITERIA VOOR BETROUWBAARHEID VAN OP KRUIP BELASTE INSTALLATIES]
C. F. Etienne *In* Nederlands Inst. voor Lastechniek Residual Life. Information Day of the Dutch Institute of Welding Techniques 1986 p 63-66 In DUTCH (For primary document see N87-15479 07-39)
Avail: NTIS HC A06/MF A01

The replica technique as an inspection method for creep damage in high temperature installations is presented. The technique is a nondestructive method to determine the structure at the surface of the material. The method is fast and not expensive. The preparation of the surface to be investigated is described. The production of a replica, which is a copy of the metal surface, is explained. The example of the inspection of a component which was subjected to long term exposure is given. The results corroborate the value of the replica method which is now generally accepted for creep damage assessment. The danger is that the efficiency of the method is overestimated; the limitations of the method are given. ESA

N87-15485# Metaalinstitut TNO, Apeldoorn (Netherlands). Stichting Geavanceerde Metaalkunde.
STRUCTURE AS A CRITERION FOR HIGH TEMPERATURE DUCTILITY [STRUCTUUR ALS CRITERIUM VOOR HOGETEMPERATUURDUCTILITEIT]
C. F. Etienne, W. Dortland, and J. C. vanWortel *In* Nederlands Inst. voor Lastechniek Residual Life. Information Day of the Dutch Institute of Welding Techniques 1986 p 67-76 In DUTCH (For primary document see N87-15479 07-39)
Avail: NTIS HC A06/MF A01

Electron microscopic structural analysis was used as a nondestructive method to determine high temperature ductility in the residual life assessment of creep-loaded installations. The most important structural criteria with respect to ductility are the amount of matrix precipitation, the degree at which the grain boundaries are occupied with precipitates, and the width of the precipitate-free zone along the grain boundaries. The investigated 13CrMo44 has low ductility at temperatures less than 515 C after long exposure times. ESA

N87-15486# Koninklijke Militaire Academie (Netherlands).
NONDESTRUCTIVE METHODS FOR THE INSPECTION OF CREEP-LOADED INSTALLATIONS [NDO-METHODEN VOOR INSPECTIE VAN OP KRUIP BELASTE INSTALLATIES] c38
L. A. J. Sarton *In* Nederlands Inst. voor Lastechniek Residual Life. Information Day of the Dutch Institute of Welding Techniques 1986 p 77-81 In DUTCH (For primary document see N87-15479

07-39)
Avail: NTIS HC A06/MF A01

A creep damage assessment which does not require dismantling of the installation is discussed. Each type of creep damage, namely cracks, voids, structural degradation, and deformations, require in principle a different type of method. Visual inspection, magnetic investigation, penetrating investigation, and crack depth measurements and their respective applications are explained. Surface cracks can be well determined; a reliable method to determine crack depths is necessary; voids at larger depths cannot yet be determined; structural investigation of the surface via replicas can be well performed in contrast with the material beneath the surface; practical deformation measuring methods are required. ESA

N87-15487# Keuring van Electrotechnische Materialen N.V., Arnhem (Netherlands).
SHORT TERM CREEP TESTS [KRUIPPROEVEN VAN KORTE DUUR]
L. B. Dufour *In* Nederlands Inst. voor Lastechniek Residual Life. Information Day of the Dutch Institute of Welding Techniques 1986 p 83-90 In DUTCH (For primary document see N87-15479 07-39)
Avail: NTIS HC A06/MF A01

Creep test methods to determine the (residual) life of 13CrMo44 creep-loaded components are presented. The components were loaded during 18,000 hr at temperatures between 510 and 525 C. Two methods based on the assumed existence of an internal friction stress are explained. These methods are not satisfactory. The procedure Maharek, based on short term creep tests at temperatures above the operation temperature and at constant loading (so-called isostress tests) is presented. This method makes it possible to express the residual life in hours in a conservative way, to determine inspection frequencies in a well-grounded way, and to make statements about creep ductility. ESA

N87-15488# National Aerospace Lab., Amsterdam (Netherlands).
FRACTURE MECHANICS AND CREEP CRACK GROWTH IN STEEL OF THE TYPE 1%Cr0.5Mo, WITH OR WITHOUT PRECEEDING EXPOSURE UNDER CREEP CRACK CIRCUMSTANCES [BREUKMECHANICA EN KRUIPSCHEURGROEI IN STAAL VAN HET TYPE 1%Cr0.5Mo AL DAN NIET NA VOORAFGAANDE EXPOSITIE ONDER KRUIPSCHEUROMSTANDIGHEDEN]
H. P. vanLeeuwen and L. Schra *In* Nederlands Inst. voor Lastechniek Residual Life. Information Day of the Dutch Institute of Welding Techniques 1986 p 91-101 In DUTCH (For primary document see N87-15479 07-39)
Avail: NTIS HC A06/MF A01

Crack initiation and propagation under creep conditions, and the application to fracture mechanics were studied. A literature study revealed that the fracture mechanics parameter with the best correlation with the creep crack propagation velocity is the cyclical J-integral. Creep crack growth tests were performed at 525 C and an equivalent Von Mises stress of 110 MPa. It is shown that the creep crack growth velocity for new pipe material, exposed pipe material, and exposed weld material correlates very well with the cyclical J-integral, but that exposed pipe material cracks much faster than new pipe material, and that weld material cracks much slower than new pipe material. ESA

N87-15489# Metaalinstitut TNO, Apeldoorn (Netherlands).
EVALUATION OF THE DUTCH WELDING INSTITUTE (RESIDUAL) LIFE PROJECT [EVALUATIE VAN HET N.I.L.-(REST) LEVENSDUURPROJECT]
C. F. Etienne *In* Nederlands Inst. voor Lastechniek Residual Life. Information Day of the Dutch Institute of Welding Techniques 1986 p 103-113 In DUTCH (For primary document see N87-15479 07-39)
Avail: NTIS HC A06/MF A01

It is shown that there exists not a single decisive method for residual life determination, but that a combination of different methods allows assessment of the residual life and the inspection frequency of creep-loaded installations. ESA

N87-15490*# Analytical Services and Materials, Inc., Hampton, Va.
SIMPLE FORMULAS FOR STRAIN-ENERGY RELEASE RATES WITH HIGHER ORDER AND SINGULAR FINITE ELEMENTS
I. S. Raju Dec. 1986 61 p
(Contracts NAS1-17808; NAS1-18256)
(NASA-CR-178186; NAS 1.26:178186) Avail: NTIS HC A04/MF A01 CSCL 20K

A general finite element procedure for obtaining strain-energy release rates for crack growth in isotropic materials is presented. The procedure is applicable to two-dimensional finite element analyses and uses the virtual crack-closure method. The procedure was applied to non-singular 4-noded (linear), 8-noded (parabolic), and 12-noded (cubic) elements and to quarter-point and cubic singularity elements. Simple formulas for strain-energy release rates were obtained with this procedure for both non-singular and singularity elements. The formulas were evaluated by applying them to two mode I and two mixed mode problems. Comparisons with results from the literature for these problems showed that the formulas give accurate strain-energy release rates. Author

N87-15491*# Pratt and Whitney Aircraft, East Hartford, Conn. Engineering Div.
CREEP FATIGUE LIFE PREDICTION FOR ENGINE HOT SECTION MATERIALS (ISOTROPIC) Interim Report
R. S. Nelson, J. F. Schoendorf, and L. S. Lin Dec. 1986 162 p
(Contract NAS3-23288)
(NASA-CR-179550; NAS 1.26:179550) Avail: NTIS HC A08/MF A01 CSCL 20K

The specific activities summarized include: verification experiments (base program); thermomechanical cycling model; multiaxial stress state model; cumulative loading model; screening of potential environmental and protective coating models; and environmental attack model. B.G.

N87-15492# Technion Research and Development Foundation Ltd., Haifa (Israel).
DURABILITY OF STRUCTURAL ADHESIVELY BONDED SYSTEMS Final Report, Nov. 1984 - Jan. 1986
O. Ishai, G. Yaniv, and P. Bar-Yoseph Jan. 1986 112 p
(Contract DAJA45-84-C-0050; DA Proj. 1L1-61102-BH-57)
(AD-A170708) Avail: NTIS HC A06/MF A01 CSCL 20/11

An experimental and analytical study was conducted for quantitative evaluation of the interdependence of stress, strain, moisture diffusion and heat conduction in a polymeric adhesive-bonded layer as a function of time. Following experimental evaluation of the necessary coefficients, a set of nonlinear coupled differential equations is solved numerically by the finite strip method. It was shown that moisture diffusion coefficient correlates well with the volumetric changes in the stressed materials. Experimental data of the deformation behavior vs. moisture diffusion in an assymmetrical epoxy-aluminum model exposed to different hygro-thermomechanical histories have shown a good correlation with analytical prediction. Author (GRA)

N87-15493# Naval Research Lab., Washington, D. C.
STRESS IN A BONDED WAFER Final Report, Oct. 1984 - Oct. 1985
Vincent J. Parks 23 Jun. 1986 36 p
(AD-A171056; NRL-MR-5809) Avail: NTIS HC A03/MF A01 CSCL 20/11

Stresses in a flat wafer, bonded on both sides to rods of another material and subjected to axial forces perpendicular to the bonded surfaces, are treated both experimentally and theoretically. A two dimensional model analysis of the axial meridian plane of the wafer shows the build-up of stresses in the corners where the bonded surfaces meet the free surface between the rods. A three dimensional model analysis of the wafer shows a similar build-up of stresses in the corners. The principal point of these analyses is that the stress build-up drops off to a uniform stress field within two wafer thicknesses from the free surface. A theoretical analysis obtains the uniform stress field that acts on the wafer beyond two thicknesses of the free surface. This

theoretical solution is shown to also give the stresses due to uniform changes in temperature of the wafer and the rods, where the wafer material and the rod material have different coefficients of thermal expansion. GRA

N87-15494# Colorado Univ., Boulder. Dept. of Mechanical Engineering.
ULTRASONIC SCATTERING AND NONDESTRUCTIVE EVALUATION OF DEFECTS
Subhendu K. Datta and Arvind H. Shah Aug. 1986 11 p
(Contract N00014-86-K-0280)
(AD-A172258; CUMER-86-5) Avail: NTIS HC A02/MF A01 CSCL 20/11

Problems of elastic wave scattering by surface-breaking and near-surface cracks are of considerable current interest for ultrasonic nondestructive evaluation. Ultrasonic scattering by surface-breaking planar and branched cracks of arbitrary orientation is the subject of this investigation. In this paper we use a hybrid technique to study the scattering of in-plane body and surface waves by canted planar and normal surface-breaking branched cracks. We focus our attention to the near-field. Numerical results are presented for the vertical surface displacement amplitudes near the base of the crack. Model calculations show that near-field surface displacements due to scattering by planar and branched cracks are quite different even when the branches are small. Also, it is found that signatures of normal and canted cracks are very dissimilar. These characteristic differences can be used to discriminate between the various cases. Although the results presented in this report are for homogeneous medium, the technique can be generalized to study cracks in a composite medium. GRA

N87-15495# Systems Science and Software, La Jolla, Calif.
STRESS RATES IN CONTINUUM MECHANICS AND COMPUTER CODES Technical Report, 1 Nov. 1984 - 1 Apr. 1986
D. H. Brownell, Jr. 10 Apr. 1986 23 p
(Contract DNA001-85-C-0024)
(AD-A172704; SSS-R-86-7887; DNA-TR-86-121) Avail: NTIS HC A02/MF A01 CSCL 20/11

The concept of an objective (frame indifferent) stress rate is introduced. The behavior of several objective stress rates in a material undergoing simple extension is discussed. The response of a hypoelastic material in simple shear, in both the elastic and elastic/plastic regimes, is evaluated, and it is concluded that for materials with low yield strength, such as metals and geologic materials, use of the Jaumann stress rate is justified. GRA

N87-15496# Fraunhofer Inst. fuer Werkstoffmechanik, Freiburg (West Germany).
EXPERIMENTAL INVESTIGATIONS WITH NOTCHED SAMPLES OF ELASTIC-PLASTIC MATERIALS BEHAVIOR [EXPERIMENTELLE UNTERSUCHUNGEN AN KERBSCHLAGPROBEN BEI ELASTICHE PLASTICHEM WERKSTOFFVERHALTEN]
J. Beinert, S. Winkler, H. Stoeckl, and J. F. Kalthoff Mar. 1984 85 p In GERMAN Sponsored by BMFT
(W-2/84; ETN-86-98226) Avail: NTIS HC A05/MF A01

Notch tests were performed under elastic-plastic conditions to verify numerical simulations. The tests were conducted with ISO-V notched samples (Charpy-V samples) made of the reactor pressure vessel steel 20Mn Mo Ni 5 5(KS13). The loading at several positions was measured during the impact process. The temperature was varied; the measurements were made for quasistationary loading for reasons of comparison. The measured data are tabulated for comparison with simulation calculations. ESA

N87-15497# United Kingdom Atomic Energy Authority, Harwell (England). NDT Metallurgy Section.
EFFECTS OF STRESS ON THE ULTRASONIC RESPONSE OF FATIGUE CRACKS
A. D. Whapham, S. Perring, and K. L. Rusbridge Sep. 1985 46 p
(AERE-R-10854) Avail: NTIS HC A03/MF A01

In order to examine the situation in which tight fatigue cracks are additionally compressed by residual or reversed stresses when tested, two fatigue cracks grown in air in BS 4360 50D steel band spacimens were tested under crack-opening and crack-closing loads. In the tightest crack grown at a stress intensity factor of 17, NNm (-3/2), it was found that the crack tip signal amplitude at zero load was 30% (-10,5dB) of the open-crack value, and that moderate opening loads were required to increase this. However, the signal is not very sensitive to additional pressure on the crack tip: 45MPa (approx. 12% yield stress) only reduced the signal to 23% (-12,8dB) of the open-crack value (three-quarters the zero-load value). The ultrasonic measurements are consistent with a model of the fatigue crack in which non-fitting roughening of the surfaces acts as a shim or wedge in the crack and so produces crack-face pressures even at zero load. The pressure right at the crack tip is believed to be near the yield stress even at zero external load. A theory developed at Harwell is consistent with the variation in diffraction signals with load over the range observed. The model of the fatigue crack indicates that ultrasound transmission should be lower in high cycle fatigue of high strength materials. Author

N87-15758# Osaka Univ. (Japan). Dept. of Welding Engineering.
ON CAVITATION AND RESIDUAL CREEP LIFE
Pertti Auerkari, Kunihiko Satoh, and Masao Toyoda *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 259-265 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

N87-15761# Osaka Univ. (Japan). Dept. of Electrical Engineering.
AN ANALYSIS METHOD OF STRONGLY CONNECTED STRUCTURE BASED ON FUNDAMENTAL CYCLES
Tatsuya Masuda, Koichi Munakata, and Katsuhiko Fujii *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 285-293 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

42 GEOSCIENCES (GENERAL)

No abstracts in this category.

43 EARTH RESOURCES AND REMOTE SENSING

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N87-15498# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
CONTRIBUTIONS TO GEODESY, PHOTOGRAMMETRY, AND CARTOGRAPHY, SERIES 2, NO. 44
1986 214 p In ENGLISH and FRENCH Papers presented at EURO CARTO IV Seminar, Frankfurt am Main, West Germany, 15-18 Oct. 1985; sponsored by the Inst. fuer Angewandte Geodaesie and the International Cartographic Association Original includes a supplement of color maps
(ISSN-0469-4244; ETN-87-98746) Avail: NTIS HC A10/MF A01

Computer aided mapping of roads, land use, and topography; digitizing map data; user requirements; and geographical data bases were discussed. For individual titles, see N87-15499 through N87-15513.

N87-15499# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
COMPUTER-ASSISTED CONSTRUCTION OF A STRUCTURAL ATLAS OF SWITZERLAND
Kurt Brassel, Guido Dorigo, and Adrian Herzog *In its* Contributions to Geodesy, Photogrammetry, and Cartography, Series 2, No. 44 1986 p 15-34 (For primary document see N87-15498 07-43)
Avail: NTIS HC A10/MF A01

A collection of statistical maps was published as a Structural Atlas of Switzerland. Approximately 120 topics were mapped at several enumeration unit levels and for each theme texts in German and French were added. Most maps were produced by a non-classed choropleth program called COPAM, others by a routine called VCPLOT. The descriptor data base consisted of 1583 items for a total of 160 enumeration units. This data base was compiled by aggregation of commune records and stored for random access. The image data base consisted of polygonal outlines for all enumeration districts. The outline loops were extracted from a 100 m x 100 m grid system with commune and lake identifiers for all hectare grid cells. Map construction was performed in an iterative batch process. Cartographic operators built up command files to produce map output on a matrix plotter. ESA

N87-15500# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
INERTIAL SURVEYING AND THE COLLECTION OF DATA BASE INFORMATION
John Davidson *In its* Contributions to Geodesy, Photogrammetry, and Cartography, Series 2, No. 44 1986 p 35-37 (For primary document see N87-15498 07-43)
Avail: NTIS HC A10/MF A01

An Inertial Land Surveyor (ILS) was adapted to carry out road survey operations. Hardware changes include the addition of an extra keyboard to allow the recording of events during the actual survey e.g., to note the overtaking of parked vehicles. A metal detector, hung under the vehicle housing the equipment, is interfaced to detect the metal studs which mark the start and end of links and sections. Software requirements include minor changes to the existing ILS real-time software and the development of an off-line processing package which runs on an HP1000 computer. This package reads information recorded by the system during road survey traverses and manipulates data to improve the real-time accuracy of survey results. ESA

N87-15501# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
TRANSFORMATION OF THE LOGIC OF A THEMATIC MAP CONSTRUCTION MODEL TO A USER INTERFACE IN AUTOMATED CARTOGRAPHY
Gunnar Grugelke *In its* Contributions to Geodesy, Photogrammetry, and Cartography, Series 2, No. 44 1986 p 39-55 (For primary document see N87-15498 07-43)
Avail: NTIS HC A10/MF A01

The transformation of the logic of the thematic map construction model (TMCM) by the user is discussed. Besides defining procedures relating to files, dimensions, scales etc., the user's task for map generation is the choice of a set of geometric reference units in the geometric data base. The set can be used to generate elementary graphical elements with appropriate graphical variables or to generate more complex cartographic signs by taking one of the cartographic presentation models of the user interface. These presentation models are predefined relations of primitive graphical elements corresponding to the relations in the construction model layer of the TMCM. Graphical variables used by a presentation model by convenience can be controlled by attributes values or by representatives of its classes. Because of the flexibility necessary for creating different kind of maps, a command driven user interface is suitable. ESA

N87-15502# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
THE DIFFERING REQUIREMENTS OF PRODUCERS AND USERS OF DATA AND THE DESIGN OF TOPOGRAPHIC/CARTOGRAPHIC DATABASES
Peter Haywood *In its* Contributions to Geodesy, Photogrammetry, and Cartography, Series 2, No. 44 1986 p 57-63 (For primary document see N87-15498 07-43)
Avail: NTIS HC A10/MF A01

It is suggested that conflict of interests between digital map data producers and users is inevitable. There is pressure on the producers to make data available quickly, and when users receive it they are critical because it appears to offer no great benefits beyond those obtainable from the use of maps. Solutions to the immediate problems may be impossible to find in a industry which is traditionally under-resourced, but it is essential to the future of cartography that the longer term implications of digital technology are appreciated. Unless cartographers adopt the view that they are in the information business as opposed to the map-production business, they may find themselves with an insignificant role to play by the end of this century. ESA

N87-15503# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
MASS DIGITIZATION: THE OLD WAY. EXPERIENCES WITH A MANUAL DIGITIZING SYSTEM
Rudolf L. Huetter *In its* Contributions to Geodesy, Photogrammetry, and Cartography, Series 2, No. 44 1986 p 65-77 (For primary document see N87-15498 07-43)
Avail: NTIS HC A10/MF A01

Applications and experiences with a manual digitizing system (MDS) embedded in a geographical information system are outlined. The MDS is intensively in use for capturing data of various provenance and quality. Resulting working methods and problems are shown, as well as solutions. The preprocessing and digitizing of thematic maps covering the same study area are described. Training is discussed. ESA

N87-15504# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
COMPUTER-AIDED PRODUCTION OF THEMATIC MAPS FOR TRAFFIC DATA
Hans F. Kern *In its* Contributions to Geodesy, Photogrammetry, and Cartography, Series 2, No. 44 1986 p 79-82 (For primary document see N87-15498 07-43)
Avail: NTIS HC A10/MF A01

It is shown that computer-aided cartography is very well suited for the designing and drafting of thematic traffic maps. Compared to other thematical drafting tasks, manual compilation of traffic data is time-consuming and error-prone. The Traffic Intensity Map 1983 was produced with computer-aided cartography in a pilot project. The construction process was repeated for the corresponding maps for 1984 and 1985. The Traffic Intensity and Accident Rate Map is of high graphical complexity. It contains the road network together with three thematical variables using data obtained from the central road data bank. ESA

N87-15505# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
PLANNING AND CONTROL OF MAP PRODUCTION AND REPRODUCTION USING COMPUTERS
Miroslav Miksovsky *In its* Contributions to Geodesy, Photogrammetry, and Cartography, Series 2, No. 44 1986 p 87-95 (For primary document see N87-15498 07-43)
Avail: NTIS HC A10/MF A01

The characteristic features of map production and reproduction and its planning and control, using network analysis, Critical Path Method, and PERT are discussed. Compilation of a universal network graph and special network graphs for every map (subproject) with time data, work quantity of each production operation, the state of the order, and the required time for completion of the product are described. Designation of priorities of orders, and allocation of available resources derived from operating capacities of the enterprise are considered. Phases of computing and output reports; application of the method on 500 simultaneously produced

orders; conditions for using computer-aided multiproject planning, and possibilities of simplifying of network graphs are treated. ESA

N87-15506# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
PROBLEMS OF DIGITAL AUTOMATED MAPPING
Sergey S. Nekhin *In its* Contributions to Geodesy, Photogrammetry, and Cartography, Series 2, No. 44 1986 p 97-100 (For primary document see N87-15498 07-43)
Avail: NTIS HC A10/MF A01

Digital methods for automated compilation of large-scale maps and plans based on terrestrial and aerial survey data as well as on the digitized maps and plans available are discussed. Characteristics of the automated system for large-scale mapping and its technological prospects are given. Hardware and software are described. Processes and techniques of automated treatment of shelf survey results for topographic mapping are outlined. ESA

N87-15507# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
MAPPING OF AGRICULTURAL LANDS IN THE USSR
Anatoly I. Panfilovich *In its* Contributions to Geodesy, Photogrammetry, and Cartography, Series 2, No. 44 1986 p 101-104 (For primary document see N87-15498 07-43)
Avail: NTIS HC A10/MF A01

Development of cadastral data acquisition through the inclusion of remote sensing procedures, and development of cartographic methods of representation and analysis are described. Mathematical methods for the investigation of national land resources and their evaluation in the context of the decision-making process are considered. Creation of a land resources data base with corresponding retrieval system for the entire national territory is discussed. Improvement of the integration of data acquisition, processing, and output as well as of the organization of land exploration at the national level is treated. ESA

N87-15508# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
AUTOMATIC GEOMETRIC CORRECTION AFTER SCANNING [CORRECTION AUTOMATIQUE DE LA GEOMETRIE APRES SCANNAGE]
Marc Pernot and Francois Salge *In its* Contributions to Geodesy, Photogrammetry, and Cartography, Series 2, No. 44 1986 p 105-135 In FRENCH; ENGLISH summary (For primary document see N87-15498 07-43)
Avail: NTIS HC A10/MF A01

Automatic editing of small scale maps (1:100,000 to 1:500,000) used in a geographic data base to eliminate geometric and logic faults due to algorithms and films is described. Editing of cross geometry and graph logic is discussed. Tests using a road mask show time savings of 80% compared with interactive editing using a digitizing table. Vector and mesh approaches are shown to be complementary, and the use of color allows different types of road (from highway to minor roads) to be distinguished. ESA

N87-15509# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
DATA GATHERING: COST/TIME CONSIDERATIONS
Monika Ranzinger *In its* Contributions to Geodesy, Photogrammetry, and Cartography, Series 2, No. 44 1986 p 137-145 (For primary document see N87-15498 07-43)
(Contract ESA-RFQ/3-4976/84-D-JS)
Avail: NTIS HC A10/MF A01

A questionnaire on data acquisition methods used in cartographic and geographical information systems is discussed. Manual digitizing is still widely employed, the use of automatic methods seems to be restricted to very specific problem areas and is applied by bigger organizations only. The reason why automatic scanning is not generally accepted is that methods for attribute assignment or for extracting descriptive information from the source template must be developed. By using post-hoc coding methods, advantages gained through scanning are lost again. Vectorization of the scanned maps is performed most of the time, although raster output and input is the more advanced technology. Recognition of symbols, and the separation of overlapping, overlain, and crossing elements must be developed. Scanners can only be applied to existing maps. Areas to be mapped digitally for the first time can either be digitized during stereocompilation or can be scanned automatically after the map is compiled by another method. ESA

N87-15510# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
THE CREATION OF AN ENVIRONMENTAL INFORMATION SYSTEM FOR THE EUROPEAN COMMUNITY c82
David Rhind, Barry Wyatt, David Briggs, and Jim Wiggins *In its* Contributions to Geodesy, Photogrammetry, and Cartography, Series 2, No. 44 1986 p 147-157 (For primary document see N87-15498 07-43)
Avail: NTIS HC A10/MF A01

The information system for the European Community program on environmental information, intended to orient policy on the environment and monitor its application; to provide a means of incorporating an environmental dimension into the Community's sectoral policies; to stimulate consistent data collection and storage in the member states; and to improve data compatibility across regional and national frontiers is discussed. The main problems are the difficulty of defining a detailed system specification before large-scale experiments are possible; the wide variations in coverage, accuracy and conceptual basis of environmental data for the 12 countries in the Community; the data volume and data structures likely to result from the project; and the ability of users to make reasonable interpretations from modeling based on less-than-consistent data, often collected for different purposes. ESA

N87-15511# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
MAP DATA REQUIREMENT FOR CIVIL LAND VEHICLE NAVIGATION AND LOCATION SYNOPSIS
A. Stratton *In its* Contributions to Geodesy, Photogrammetry, and Cartography, Series 2, No. 44 1986 p 163-167 (For primary document see N87-15498 07-43)
Avail: NTIS HC A10/MF A01

Civil land vehicle navigation and location systems map data requirements for selective data with emphasis on road structure, ability to superimpose gazetteer data that is not normally on the map, and digital data available in graphic form are discussed. Such data is not currently available from a central source and companies in the civil land vehicle navigation and location business are spending increasing resources in producing it for themselves. The attention of the national mapping authorities is drawn to this rapidly growing market. ESA

N87-15512# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
A DIGITAL RASTER PROCEDURE FOR UPDATING A TOPOGRAPHIC MAP
Wigand Weber *In its* Contributions to Geodesy, Photogrammetry, and Cartography, Series 2, No. 44 1986 p 169-192 (For primary document see N87-15498 07-43)
Avail: NTIS HC A10/MF A01

The use of digital raster techniques to update a 1:200,000 map series of 44 sheets with high information density and subtle symbolization is discussed. The map is printed with 10 real colors, 3 devoted to hillshading alone. The series is updated using traditional manual and photomechanical techniques. The cycle time of updating is 6 to 7 yr, and 5000 working hours are needed for updating each sheet. The prototype digital system transforms the original patterns to new patterns in a form suitable of updating. The updated patterns are transformed into printable formats and completed by legend patterns. True and mixed color printing is done. Lettering is updated by vector techniques. ESA

N87-15513# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).

PROBLEMS IN ESTABLISHING AND UPDATING A DIGITAL CARTOGRAPHIC DATA BASE AT THE MILLIONTH SCALE
c62
Ingo Wilski *In its* Contributions to Geodesy, Photogrammetry, and Cartography, Series 2, No. 44 1986 p 193-211 (For primary document see N87-15498 07-43)
Avail: NTIS HC A10/MF A01

The structure and contents of a digital cartographic data base for the 1:1 million scale are described. Comparison of the control plots produced from the digital data of the projection, sheet division, and symbolization of the International Map of the World on the Millionth Scale with the plates used for manual digitization shows considerable, frequently grave, errors in the digital data stock. A major part of these errors is due to the procedure of manual digitization and can be eliminated through interactive processing only. Another part is conditioned by the base material (edge matching) and can be removed to an extent under program control but a large part remains to be done interactively. The possibilities for improvement of symbolization must be made fully utilized. Updating of the definitely corrected data stock can then be carried out by procedures developed for correction. ESA

N87-15514*# Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
ESTIMATION OF VEGETATION COVER AT SUBPIXEL RESOLUTION USING LANDSAT DATA Interim Technical Report, 1 Jun. - 30 Nov. 1986
Michael F. Jasinski and Peter S. Eagleson Nov. 1986 64 p
(Grant NAG5-510)
(NASA-CR-177077; NAS 1.26:177077) Avail: NTIS HC A04/MF A01 CSCL 02C

The present report summarizes the various approaches relevant to estimating canopy cover at subpixel resolution. The approaches are based on physical models of radiative transfer in non-homogeneous canopies and on empirical methods. The effects of vegetation shadows and topography are examined. Simple versions of the model are tested, using the Taos, New Mexico Study Area database. Emphasis has been placed on using relatively simple models requiring only one or two bands. Although most methods require some degree of ground truth, a two-band method is investigated whereby the percent cover can be estimated without ground truth by examining the limits of the data space. Future work is proposed which will incorporate additional surface parameters into the canopy cover algorithm, such as topography, leaf area, or shadows. The method involves deriving a probability density function for the percent canopy cover based on the joint probability density function of the observed radiances. M.G.

N87-15515# Committee on Science and Technology (U. S. House).
H.R. 4932: TO AMEND LAND REMOTE SENSING COMMERCIALIZATION
Washington GPO 1986 64 p Hearing on H.R. 4932 before the Subcommittee on Space Science and Applications of the Committee on Science and Technology, 99th Congress, 2d Session, No. 147, 18 Jul. 1986
(GPO-64-491) Avail: Subcommittee on Space Science and Applications

Provisions of H.R. 4932, Amendments to the Land Remote-Sensing Commercialization Act of 1984 (P.L. 98-365), are examined. The bill calls for the establishment of a National Remote Sensing Advisory Committee comprised of data users, data vendors, technology developers, system operators, and data processors from the Government and the private sector. Other provisions of H.R. 4932 are directed towards the facilitation of data exchange between Government and private sector operators for research and development. Testimony is presented from representatives of NASA, NOAA, the Earth Observation Satellite Company, and Geosat Committee, Incorporated. M.G.

N87-15516*# Nebraska Univ., Lincoln. Center for Agricultural Meteorology and Climatology.
COMPARISON OF MEASURED AND MODELED RADIATION, HEAT AND WATER VAPOR FLUXES: FIFE PILOT STUDY Status Report, 1 Apr. 1985 - 31 Dec. 1986
Blaine L. Blad, Kenneth G. Hubbard, Shashi B. Verma, Patrick Starks, John M. Norman, and Elizabeth Walter-Shea Jan. 1987 52 p
(Grant NAG5-561)
(NASA-CR-179989; NAS 1.26:179989; CAMaC-87-1) Avail: NTIS HC A04/MF A01 CSCL 02C

The feasibility of using radio frequency receivers to collect data from automated weather stations to model fluxes of latent heat, sensible heat, and radiation using routine weather data collected by automated weather stations was tested and the estimated fluxes were compared with fluxes measured over wheat. The model Cupid was used to model the fluxes. Two or more automated weather stations, interrogated by radio frequency and other means, were utilized to examine some of the climatic variability of the First ISLSCP (International Satellite Land-Surface Climatology Project) Field Experiment (FIFE) site, to measure and model reflected and emitted radiation streams from various locations at the site and to compare modeled latent and sensible heat fluxes with measured values. Some bidirectional reflected and emitted radiation data were collected from 23 locations throughout the FIFE site. Analysis of these data along with analysis of the measured sensible and latent heat fluxes is just beginning. B.G.

N87-15517*# South Dakota State Univ., Brookings.
MODELING ENERGY FLOW AND NUTRIENT CYCLING IN NATURAL SEMIARID GRASSLAND ECOSYSTEMS WITH THE AID OF THEMATIC MAPPER DATA Semiannual Progress Report
James K. Lewis [1987] 16 p Original contains color illustrations
(Contract NAS5-28766)
(NASA-CR-179903; NAS 1.26:179903; SAPR-2) Avail: NTIS HC A02/MF A01 CSCL 13B

Energy flow and nutrient cycling were modeled as affected by herbivory on selected intensive sites along gradients of precipitation and soils, validating the model output by monitoring selected parameters with data derived from the Thematic Mapper (TM). Herbivore production was modeled along the gradient of soils and herbivory, and validated with data derived from TM in a spatial data base. B.G.

N87-15518*# California Univ., Santa Barbara. Dept. of Geography.
CANOPY REFLECTANCE MODELING IN A TROPICAL WOODED GRASSLAND Final Report
David Simonett and Janet Franklin 1986 64 p
(Grant NAGw-788)
(NASA-CR-180097; NAS 1.26:180097) Avail: NTIS HC A04/MF A01 CSCL 02F

Geometric/optical canopy reflectance modeling and spatial/spectral pattern recognition is used to study the form and structure of savanna in West Africa. An invertible plant canopy reflectance model is tested for its ability to estimate the amount of woody vegetation from remotely sensed data in areas of sparsely wooded grassland. Dry woodlands and wooded grasslands, commonly referred to as savannas, are important ecologically and economically in Africa, and cover approximately forty percent of the continent by some estimates. The Sahel and Sudan savannas make up the important and sensitive transition zone between the tropical forests and the arid Sahara region. The depletion of woody cover, used for fodder and fuel in these regions, has become a very severe problem for the people living there. LANDSAT Thematic Mapper (TM) data is used to stratify woodland and wooded grassland into areas of relatively homogeneous canopy cover, and then an invertible forest canopy reflectance model is applied to estimate directly the height and spacing of the trees in the stands. Because height and spacing are proportional to biomass in some cases, a successful application of the segmentation/modeling techniques will allow direct estimation of tree biomass, as well as cover density, over significant areas of these valuable and sensitive ecosystems. The model being tested in sites in two different

bioclimatic zones in Mali, West Africa, will be used for testing the canopy model. Sudanian zone crop/woodland test sites were located in the Region of Segou, Mali. Author

N87-15519# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil). Dept. de Sensoriamento Remoto.
THE USE OF AERIAL REMOTE SENSING IN A CASE STUDY OF DESERTIFICATION: QUIXABA-PE [O USO DE SENSORIAMENTO REMOTO AEREO PARA UM ESTUDO DE CASO DE DESERTIFICACAO: QUIXABA-PE]
Vitor Celso deCarvalho Jul. 1986 19 p In PORTUGUESE Presented at the 1st National Meeting of the Middle Atmosphere Study, Garanhuns, Brazil, 6-11 Oct. 1986
(INPE-3963-PRE/980) Avail: NTIS HC A02/MF A01

The Brasilian semiarid northeast, pointed out as one of the problem regions of the land, is presented, as a consequence of its fragile environment and high risk of desertification. A case of vegetative development in one of the problem sectors, a region of Quixaba', between the cities of Ouricuri and Parnamirim-PE, is found and analyzed qualitatively by interpretation of multi-seasonal area photographs (during 1955, 1965, and 1983). The results show an increase and notable agrarian shift in the region, but no change in the process of rapid degradation of its land. The situation at present is alarming, with almost 15% of its land now unproductive through human or natural action. Author

N87-15245# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
PRESENTATION OF THE STATUS OF THE EXPERIMENT MONOCULAR ELECTRO-OPTICAL STEREO SCANNER (MEOSS)
F. Lanzl *In its* Colloquium about Joint Projects within the DFVLR/ISRO Cooperation Jul. 1986 p 73-81 (For primary document see N87-15240 07-12)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne, West Germany DM 46

N87-15351*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
RIVITED PANEL SURFACE MEASUREMENT USING PHOTOGRAMMETRY
W. D. Merrick, V. B. Lobb, F. L. Lansing, and F. W. Stoller *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 193-205 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 14E

N87-15548# Canadian Climate Centre, Sidney (British Columbia). Inst. of Ocean Sciences.
THE ATMOSPHERIC BOUNDARY LAYER AND ITS PARAMETERIZATION
Gordon McBean *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 17-22 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15554# Centre de Recherches en Physique de l'Environnement, Issy-les-Moulineaux (France).
MODELISATION OF EVAPOTRANSPIRATION AND SOIL AVAILABLE WATER OVER AN AGRICULTURAL REGION APPLICABLE FOR REMOTE SENSING
O. Taconet *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 65-71 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15564# Meteorological Office, Bracknell (England).
THE SENSITIVITY OF THE UK METEOROLOGICAL OFFICE ATMOSPHERIC GENERAL CIRCULATION MODEL TO RECENT CHANGES TO THE PARAMETERIZATION OF HYDROLOGY
David A. Warrilow *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 143-149 (For primary document see N87-15544 07-46)
(Contract CEC-CL.113.UK(H))
Avail: NTIS HC A99/MF A01

N87-15569# Meteorological Office, Bracknell (England).
REMOTE SENSING IDENTIFIED IN CLIMATE MODEL EXPERIMENTS WITH HYDROLOGICAL AND ALBEDO CHANGES IN THE SAHEL
P. R. Rowntree and A. B. Sangster *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 175-183 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15570# World Meteorological Organization, Geneva (Switzerland). Hydrology and Water Resources Dept.
GLOBAL RUNOFF DATA SETS AND USE OF GEOGRAPHIC INFORMATION SYSTEMS
J. Nemec *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 185-189 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15572# Osnabrueck Univ. (West Germany). General Ecology Group.
EVALUATION OF CLIMATE RELEVANT LAND SURFACE CHARACTERISTICS FROM REMOTE SENSING
G. Esser and H. Lieth *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 205-211 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15579# Universite Catholique de Louvain (Belgium). Inst. d'Astronomie et de Geophysique.
ESTIMATION OF SURFACE ALBEDO USING SATELLITE DATA. A SIMPLE FORMULATION FOR ATMOSPHERIC EFFECTS
J. L. Melice *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 263-265 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15583# Freie Univ., Berlin (West Germany). Inst. of Meteorology.
SATELLITE-DERIVED VEGETATION INDEX OVER EUROPE
Klaus Bluemel and W. Tonn *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 281-285 Original contains color illustrations (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15584# Durham Univ. (England). Dept. of Geography.
VEGETATION INDEX MODELS FOR THE ASSESSMENT OF VEGETATION IN MARGINAL AREAS
R. Harris *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 287-291 Sponsored by Durham Univ.'s Middle East Center, England (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15585# New Zealand Meteorological Service, Wellington.
CALIBRATION OF NORMALIZED VEGETATION INDEX AGAINST PASTURE GROWTH
B. F. Taylor, P. W. Dini, and J. W. Kidson *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 293-297 Original contains color illustrations (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15588# Mullard Space Science Lab., Dorking (England).
THE PROSPECTS FOR HYDROLOGICAL MEASUREMENTS USING ERS-1
M. A. J. Guzkowska, I. M. Mason, C. G. Rapley, and F. A. Street-Perrott (Oxford Univ., England) *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 321-326 Sponsored by UK Science and Engineering Research Council (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15589# Consiglio Nazionale delle Ricerche, Florence (Italy).
CONTRIBUTION OF PASSIVE MICROWAVE REMOTE SENSING IN SOIL MOISTURE AND EVAPOTRANSPIRATION MEASUREMENTS
P. Pampaloni, S. Paloscia, and L. Chiarantini (Segnalamento Marittimo ed Aereo S.p.A., Florence, Italy) *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 327-332 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15591# Institut National de la Recherche Agronomique, Avignon (France). Station de Bioclimatologie.
ESTIMATION OF REGIONAL EVAPORATION USING MIDDAY SURFACE TEMPERATURE FROM SATELLITE THERMAL IR DATA
B. Seguin, J. P. Lagouarde, and Y. Kerr (Centre National d'Etudes Spatiales, Toulouse, France) *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 339-344 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15595# Consiglio Nazionale delle Ricerche, Florence (Italy).
EVALUATION OF THE GEOSTATIONARY SATELLITE IMAGES GROUND RESOLUTION
P. Beni, V. Cappellini, R. Carla, and G. Maracchi *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 367-370 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15596# Rome Univ. (Italy). Dipt. di Fisica.
EFFECTS OF ATMOSPHERIC AEROSOL SIZE DISTRIBUTIONS ON THE RETRIEVAL OF SURFACE SPECTRAL RADIANCE FROM SATELLITE
C. Martellacci, G. Fiocco, and G. P. Gobbi (Consiglio Nazionale delle Ricerche, Frascati, Italy) *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 371-377 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15597# Niamey Univ. (Niger). Faculty of Sciences.
GROUND BASED ATMOSPHERIC EXTINCTION MEASUREMENT IN THE SAHEL
Abdelkrim Ben Mohamed *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 379-380 Sponsored by International Satellite Land-Surface Climatology Project (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15598# National Aeronautical Establishment, Ottawa (Ontario).
REGIONAL MEASUREMENTS OF EVAPOTRANSPIRATION USING AIRCRAFT MOUNTED SENSORS
R. L. Desjardins, E. J. Brach, J. I. MacPherson, P. H. Schuepp (McGill Univ., Montreal, Quebec), and L. Austin (McGill Univ., Montreal, Quebec) *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 381-386 Sponsored by Energy Program of Agriculture Canada Prepared in cooperation with Agriculture Canada, Ottawa, Ontario (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15599# Universite Catholique de Louvain (Belgium).
SONIC ANEMONETER SURFACE HEAT FLUX MEASUREMENTS FOR VALIDATION OF SATELLITE OBSERVATIONS
S. Cieslik, G. Schayes, and H. Hasenjeager (Joint Research Centre of the European Communities, Ispra, Italy) *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 387-392 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15600# Tsolakidis (Costas), Piraeus (Greece).
LOCATION FINDING USING METEOROLOGICAL SATELLITE IMAGES
Costas Tsolakidis *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 393-398 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15605# Calabar Univ. (Nigeria). Dept. of Geography and Regional Planning.
REGIONAL STUDIES WITH SATELLITE DATA IN AFRICA ON THE DESERTIFICATION OF THE SUDAN-SAHEL BELT IN NIGERIA
D. O. Adefolalu *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 429-438 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15607# Kenya Meteorological Dept., Nairobi.
USE OF REMOTE SENSING APPLICATION FOR AGRICULTURAL EXPANSION INTO SEMI-ARID AREAS OF KENYA
Silvery B. B. Otengi *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 443-448 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15609# Reading Univ. (England). Dept. of Meterology.
HYDROLOGICAL STUDIES IN NIGER
I. D. Flitcroft, G. Dugdale, and J. R. Milford *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 455-459 Sponsored by UK Overseas Development Agency and the European Economic Community (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15610# Innsbruck Univ. (Austria). Inst. of Meteorology and Geophysics.
VEGETATION IDENTIFICATION AND VARIABILITY IN THE TAHOUA AREA, NIGERIA
H.-J. Bolle *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 461-466 Original contains color illustrations (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15611# Instituut voor Culturrtechniek en Waterhuishouding, Wageningen (Netherlands).
GROUND WATER-FED LAKES IN THE LIBYAN DESERT: THEIR VARYING AREA AS OBSERVED BY MEANS OF LANDSAT-MSS DATA
H. Kuipers and M. Meneti *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 467-471 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15612# Ghent Univ. (Belgium). Lab. for Regional Geography.
ASSESSMENT OF WIND AND FLUVIAL ACTION BY USING LANDSAT-MSS COLOR COMPOSITES IN THE LOWER NILE VALLEY (EGYPT)
A. Gad and L. Daels *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 473-476 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15613# Universidad Nacional de Mexico, Mexico City. Inst. de Geofisica.
SYSTEMS APPROACH TO QUANTIFY DESERTIFICATIONS PROCESSES USING LANDSAT-MSS DATA

Juan Carlos delaTorre *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 477-481 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15614# Kasetsart Univ., Bangkok (Thailand). Faculty of Forestry.
THE APPLICATION OF LANDSAT IMAGERY FOR LAND COVER ASSESSMENT
S. Wacharakitti *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 483-486 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15615# Lund Univ. (Sweden). Lab. of Remote Sensing.
SURFACE ALBEDO CHANGE IN ARID REGIONS IN THE SUDAN
L.-O. Zell *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 487-491 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15618# Zurich Univ. (Switzerland). Dept. of Geography.
MONITORING OF LAND-SURFACE CHANGE IN SRI LANKA
H. Haefner and S. D. F. C. Nanayakkara (Survey Dept., Colombo, Sri Lanka) *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 501-507 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15621# Consiglio Nazionale delle Ricerche, Florence (Italy).
AN INTEGRATED SYSTEM TO ASSESS AGRICULTURAL PRODUCTIVITY
C. Conese, G. Maracchi, F. Miglietta, V. Cappelini, R. Carla, and V. Sacco *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 523-530 Original contains color illustrations (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15622# Indian Space Research Organization, Ahmedabad. Space Applications Centre.
AVHRR AND MSS DATA BASED VEGETATION INDICES STUDIES OVER INDIAN SITES
R. K. Gupta (National Remote Sensing Agency, Hyderabad, India), B. K. Ranganath (National Remote Sensing Agency, Hyderabad, India), S. T. Chari (National Remote Sensing Agency, Hyderabad, India), and R. P. S. Chhonkar *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 531-535 Original contains color illustrations (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15623# Thessaloniki Univ. (Greece). Dept. of Biology.
THE USE OF REMOTE SENSING TECHNIQUES IN THE STUDY OF VEGETATION RECOVERY AFTER FIRE IN MEDITERRANEAN COUNTRIES (A PRELIMINARY STUDY)
J. Diamantopoulos and S. Paraskevopoulos *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 537-538 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15624# Marmara Research Inst., Gebze (Turkey).
REMOTE SENSING ACTIVITES IN TURKEY: POSSIBLE CONTRIBUTIONS TO CLIMATE STUDIES
F. Ince *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 539-540 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15625# Centre National de la Recherche Scientifique, Strasbourg (France). Groupement Scientifique de Teledetection Spatiale.
DESIGN OF A DATA BASE SYSTEM FOR INFERRING LAND SURFACE PARAMETERS AND FLUXES FROM SATELLITE RADIANCES
L. Asfar (IBM France S. A., Paris), A. Asem (IBM France S. A., Paris), F. Becker, P. Y. Deschamps (Centre National d'Etudes Spatiales, Toulouse, France), P. DeFraipont, D. Ho (IBM France S. A., Paris), J. L. Mercier, E. Olory-Hechinger, P. Olory (IBM France S. A., Paris), M. Raffy et al *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 541-548 Sponsored by CNRS, CNES, and IBM (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15626# Environmental Analysis and Remote Sensing, Delft (Netherlands).
GROUP AGROMET MONITORING PROJECT (GAMP) METHODOLOGY INTEGRATED MAPPING OF RAINFALL, EVAPOTRANSPIRATION, GERMINATION, BIOMASS DEVELOPMENT AND THERMAL INERTIA, BASED ON METEOSAT AND CONVENTIONAL METEOROLOGICAL DATA
A. Rosema *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 549-557 Original contains color illustrations (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15627# Centre National de Recherches Meteorologiques, Toulouse (France). Etablissement d'Etudes et de Recherche Meteorologiques.
HYDROLOGICAL ATMOSPHERIC PILOT EXPERIMENT (HAPEX) 86
J. P. Goutorbe *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 559-561 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15628# Instituut voor Culturrtechniek en Waterhuishouding, Wageningen (Netherlands).
FUTURE EUROPEAN PLANS IN THE FRAMEWORK OF THE INTERNATIONAL SATELLITE LAND SURFACE CLIMATOLOGY PROJECT (ISLSCP)
M. Menenti and F. Becker (Centre National de la Recherche Scientifique, Strasbourg, France) *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 563-566 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15632# INAP, Paris (France).
HYDROLOGICAL ATMOSPHERIC PILOT EXPERIMENT (HAPEX) HYDROLOGY BUDGET MODELING (MOBILHY): OUTLINE OF THE PROGRAM
Andree Tuzet *In* Ludwig-Maximilians-Universitaet Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 19-23 (For primary document see N87-15630 07-46)
Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

N87-15652# GKSS-Forschungszentrum Geesthacht (West Germany). Inst. fuer Physik.
MULTIANGLE OR MULTIWAVELENGTH TECHNIQUE FOR REMOTE SENSING OF SEA SURFACE TEMPERATURE
Walter Meyer (Kiel Univ., West Germany) and Hartmut Grassl *In* Ludwig-Maximilians-Universitaet Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 155-162 (For primary document see N87-15630 07-46)
Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

N87-15653# Clermont-Ferrand Univ. (France).
ESTIMATE OF BROADBAND CONVERSION FACTORS FOR THE METEOSAT VIS CHANNEL
J. Stum and B. Pinty *In* Ludwig-Maximilians-Universitaet Satellite

Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 163-171 (For primary document see N87-15630 07-46)
Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

N87-15654# Cologne Univ. (West Germany). Inst. fuer Geophysik und Meteorologie.
THE MODULATION TRANSFER OF THE AIRBORNE VERSION OF THE CONICAL SCAN RADIOMETER (AVCSR)
Bernd Bauch and Detlef Hennings *In* Ludwig-Maximilians-Universitaet Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 175-179 (For primary document see N87-15630 07-46)
Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells; global sources of energy; geophysical conversion; and windpower.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *28 Propellants and Fuels.*

N87-15520# Applied Solar Energy Corp., City of Industry, Calif.
RUGGED, THIN GaAs SOLAR CELL DEVELOPMENT, PHASE 1 Interim Report, Aug. 1984 - Nov. 1985
Y. C. Yeh, Kou-I Chang, and Peter A. Iles 16 Jun. 1986 28 p
(Contract F33615-84-C-2403)
(AD-A171188; AFWAL-TR-86-2006) Avail: NTIS HC A03/MF A01 CSCL 10/2

This report describes the Phase 1 efforts in developing high efficiency gallium arsenide (GaAs) on germanium (Ge) solar cells, for enhanced survivability and ruggedness over conventional devices. The GaAs/Ge cells will be optimized in Phase 2 (for high power to weight ratios) and extensively tested in Phase 3. GRA

N87-15521# Department of Energy, Washington, D. C.
CURRENT- AND LATTICE-MATCHED TANDEM SOLAR CELL Patent Application
J. M. Olson, inventor (to DOE) (Midwest Research Inst., Golden, Colo.) Filed 21 Oct. 1985 24 p
(Contract DE-AC02-83CH-10093)
(DE86-013757; US-Patent-Appl-SN-790600) Avail: NTIS HC A02/MF A01

A multijunction (cascade) tandem photovoltaic solar cell device is fabricated of a Ga(sub x)In(sub 1-x)P (0.505 equal to or less than x equal to or less than 0.515) top cell semiconductor lattice-matched to a GaAs bottom cell semiconductor at a low resistance heterojunction, preferably a p+/n+ heterojunction between the cells. The top and bottom cells are both lattice-matched and current-matched for high efficiency solar radiation conversion to electrical energy. DOE

N87-15522# Institute of Gas Technology, Chicago, Ill.
HIGH-TEMPERATURE COMPOSITE THERMAL ENERGY STORAGE FOR SOLAR APPLICATIONS Draft Final Report
E. T. Ong, R. J. Petri, and D. S. Erickson Jan. 1986 59 p
(Contract DE-AC03-83SF-11936)
(DE86-014161; DOE/SF-11936/T1) Avail: NTIS HC A04/MF A01

The objective of this program was to evaluate and screen concepts of applying direct-contact, sensible/latent heat storage media to the very high temperature regimes of high-efficiency solar power generation and solar chemicals/fuels and process heat. DOE

N87-15523# Genesis Scientific Enterprises, Archer, Fla.
APPROPRIATE TECHNOLOGY SMALL GRANTS PROGRAM Final Financial Status Report
B. R. Davis Jun. 1986 36 p
(Contract DE-FG44-81R4-10465)
(DE86-015463; DOE/R4-10465/T1) Avail: NTIS HC A03/MF A01

The goal of the project was to produce a wind electric generating system capable of functioning in a relatively low wind energy area like Florida and the southeastern region of the US. Design and construction efforts for the wind tunnel system are presented. Photographs of the vertical axis wind turbine and the wind tunnel are included. DOE

N87-15772# Osaka Univ. (Japan). Dept. of Applied Chemistry.
EFFECTS OF PHOSPHORIC ACID ON THE LEAD-ACID BATTERY REACTIONS
Osamu Ikeda, Chiaki Iwakura, Hiroshi Yoneyama, and Hideo Tamura *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 387-396 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

45 ENVIRONMENT POLLUTION

Includes atmospheric, noise, thermal, and water pollution.

N87-15524*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FIELD TEST TO INTERCOMPARE CARBON MONOXIDE, NITRIC OXIDE AND HYDROXYL INSTRUMENTATION AT WALLOPS ISLAND, VIRGINIA
Gerald L. Gregory, Sherwin M. Beck, and Richard J. Bendura Jan. 1987 173 p
(NASA-TM-87718; L-16126; NAS 1.15:87718) Avail: NTIS HC A08/MF A01 CSCL 13B

Documentation of the first of three instrument intercomparisons conducted as part of NASA Global Tropospheric Experiment/ Chemical Instrumentation Test and Evaluation (GTE/CITE-1) is given. This ground-based intercomparison was conducted during July 1983 at NASA Wallops Flight Facility. Instruments intercompared included one laser system and three grab-sample approaches for CO; two chemiluminescent systems and one laser-induced fluorescent (LIF) technique for NO; and two different LIF systems and a radiochemical tracer technique for OH. The major objectives of this intercomparison was to intercompare ambient measurements of CO, NO, and OH at a common site by using techniques of fundamentally different detection principles and to identify any major biases among the techniques prior to intercomparison on an aircraft platform. Included in the report are comprehensive discussions of workshop requirements, philosophies, and operations as well as intercomparison analyses and results. In addition, the large body of nonintercomparison data incorporated into the workshop measurements is summarized. The report is an important source document for those interested in conducting similar large and complex intercomparison tests as well as those interested in using the data base for purposes other than instrument intercomparison. Author

N87-15525*# National Aeronautics and Space Administration, Washington, D.C.
CONTROL OF H2S EMISSIONS USING AN OZONE OXIDATION PROCESS: PRELIMINARY RESULTS
D. DeFaveri, B. Ferrando, and G. Ferraiolo Sep. 1986 13 p Transl. into ENGLISH from La Chimica e l'Industria (Italy), v. 67, no. 9, Sep. 1985 p 463-466 Transl. by The Corporate Word, Inc., Pittsburgh, Pa.
(Contract NASw-4006)
(NASA-TM-88475; NAS 1.15:88475) Avail: NTIS

HC A02/MF A01 CSCL 13B

The problem of eliminating industrial emission odors does not have a simple solution, and consequently has not been researched extensively. Therefore, an experimental research program regarding oxidation of H2S through ozone was undertaken to verify the applicable limits of the procedure and, in addition, was designed to supply a useful analytical means of rationalizing the design of reactors employed in the sector. Author

N87-15604# Lund Univ. (Sweden). Remote Sensing Lab.
DESERTIFICATION MONITORING: REMOTELY SENSED DATA FOR DROUGHT IMPACT STUDIES IN THE SUDAN
Ulf Hellden *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 417-428 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15617# Sherbrooke Univ. (Quebec). Centre d'Applications et de Recherche en Teledetection.
PRELIMINARY RESULTS OF ANTHROPOGENIC ALBEDO CHANGES OVER THE PAST 15 YEARS IN EASTERN CANADA
Alain Royer, Lise Charbonneau, and Ferdinand Bonn *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 497-499 (For primary document see N87-15544 07-46)
(Grants NSERC-A-8643; NSERC-A-5252; FCAR-EQ-102)
Avail: NTIS HC A99/MF A01

N87-15619# University of the West Indies, Kingston (Jamaica).
VEGETATION CHANGE AND DESERTIFICATION IN THE CARIBBEAN
L. Alan Eyre *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 509-514 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N87-15526 Arkansas Univ., Fayetteville.
MATHEMATICAL MODELING AND EXPERIMENTAL INVESTIGATION OF HEAVIER-THAN-AIR GAS DISPERSION IN THE ATMOSPHERE Ph.D. Thesis
Thomas O. Spicer 1985 267 p
Avail: Univ. Microfilms Order No. DA8618059

The mathematical modeling methods which have been proposed for prediction of dispersion of heavier-than-air gases (HTAG) are reviewed. The phenomenology of atmospheric dispersion of HTAG is described, and the general HTAG dispersion scenario is considered to involve three phases: (1) negative buoyancy-dominated flow; (2) stably stratified shear flow; and (3) passive diffusion due to atmospheric turbulence. Modeling concepts based on investigations of laboratory experiments are used to describe the flow and dilution processes that characterize the negative buoyancy regime. Laboratory measurements of the spreading and dilution of HTAG volumes released suddenly in calm air have demonstrated scaling methods for small releases from 35 to 530 liters, and the scaled laboratory releases are in good agreement with the experimental data from the Thorney island 2000 m3 releases. The laboratory releases are modeled using a radial momentum balance and a box model approach with dilution during the gravity spreading phase represented by a frontal entrainment velocity. Experimental laboratory data on stratified shear flow mixing from McQuaid (1976), Kantha et al. (1977), and Lofquist (1960) are used to model the vertical diffusion of HTAG in the atmospheric constant stress layer. An interactive computer model (DEGADIS) is developed which can be used to simulate a wide variety of HTAG release scenarios including instantaneous releases, time-varying release, and continuous releases on a flat, obstacle-free suface. Dissert. Abstr.

N87-15527 Brown Univ., Providence, R. I.
STUDIES OF STRESS AND DEFORMATION IN THE EARTH'S CRUST: PART 1: DETERMINING THE STATE OF STRESS IN THE EARTH FROM EARTHQUAKE FOCAL MECHANISM DATA. PART 2: DEFORMATION AROUND THE CREEDE CALDERA, SAN JUAN VOLCANIC FIELD, SOUTHWEST COLORADO: IMPLICATIONS FOR CALDERA MECHANICS Ph.D. Thesis
John Wesley Gephart 1986 107 p
Avail: Univ. Microfilms Order No. DA8617566

An inverse method for determining best fit regional stress directions and R = (sigma sub 2 x sigma sub 1)/(sigma sub 3 x sigma sub 1), a measure of relative stress magnitudes, from a set of earthquake focal mechanisms were presented. The hypothesis that deformation around the Creede Caldera, southwest Colorado, is due to isostatic adjustments following Caldera formation, involving uplift of the Caldera floor and subsidence of a surrounding dome was considered. Dissert. Abstr.

N87-15528*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FUTURE DIRECTIONS FOR H SUB x O SUB y DETECTION
David R. Crosley, ed. (SRI International Corp., Menlo Park, Calif.) and James M. Hoell, ed. Dec. 1986 67 p Workshop held in Menlo Park, Calif., 12-15 Aug. 1985
(NASA-CP-2448; L-16216; NAS 1.55:2448) Avail: NTIS HC A04/MF A01 CSCL 04A

The activities and recommendations of the NASA workshop on the Future Directions for H sub x O sub y detection are given. The objective of this workshop was to access future directions for the measurement of the OH radical as well as other H sub x O sub y species. The workshop discussions were focused by two broad questions: (1) What are the capabilities of potential measurement methods? and (2) Will the results from the most promising method be useful in furthering understanding of tropospheric chemistry? For individual titles, see N87-15529 through N87-15543.

N87-15529*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FUTURE DIRECTIONS FOR H SUB x O SUB y DETECTION, EXECUTIVE SUMMARY
In its Future Directions for H sub x O sub y Detection Dec. 1986 p 1-30 (For primary document see N87-15528 07-46)
Avail: NTIS HC A04/MF A01 CSCL 04A

New methods for the measurement of OH radicals were assessed as were currently available and possible future methods for the other H sub x O sub y species, HO2 and H2O2. The workshop participants were invited from different groups: modelers of atmospheric photochemistry, experimentalists measuring H sub x O y species with laser and nonlaser methods, and chemists and physicists familiar with such experiments but not involved in atmospheric monitoring. There were three major conclusions from the workshop concerning the OH radical. First, it was felt that local measurements made by laser techniques would be ready within 2 or 3 years to furnish reliable measurements at the level of 1,000,000 cu. cm. Second, measurements at this level of sensitivity and with attainable levels of precision could indeed be used to make useful and interesting tests of the fast photochemistry of the troposphere. It is important, however, that the measurements be carefully designed, with respect to spatial and temporal averaging, if there is to be a meaningful comparison between results from two experimental methods or a measurement and a model. Third, nonlocal measurements using released reactants and tracers would also be very useful. These could be made on a regional or global basis, although they still require experimental design including choice of compounds. E.R.

N87-15530*# Kernforschungsanlage, Juelich (West Germany). Dept. of Atmospharische Chemie.
OH RADICAL MEASUREMENTS BY OPTICAL ABSORPTION

SPECTROSCOPY
U. Platt and D. H. Ehhalt *In* NASA. Langley Research Center Future Directions for H sub x O sub y Detection Dec. 1986 p 31-32 (For primary document see N87-15528 07-46)
Avail: NTIS HC A04/MF A01 CSCL 04A

The long path absorption spectroscopy (LPA) measurement of OH utilizes the strong UV absorption spectrum of the molecule with well resolved rotational lines around 308 nm. The light source consists of an Ar ion laser pumped CW dye laser, the output of which is frequency doubled to emit a spectrally smooth light profile of 0.1 nm FWHM at 308 nm. This is considerably broader than the sharp (0.0018 nm wide) absorption features of OH and also wider than the total spectral region (0.06 nm) scanned around the OH lines. For field measurements a Cassegrain-type telescope expands the small diameter of the original laser beam by a factor of 50 to about a 0.25-m diameter in order to reduce the divergence of the beam as well as its mean photon flux density, thus reducing the maximum self-generated OH concentration to 40,000 cu. cm. The light is passed into the open atmosphere and reflected at about 5 km distance resulting in a 10-km light path length. A telescope focuses the returning light onto the entrance slit of a monochromator the single exit slit of which is replaced by a mechanical scanning device operating at a scan repetition rate of 6.6 KHz. For a typical measurement (1h duration) some 20,000, 000 scans are averaged, rendering the contribution of atmospheric turbulence to the spectral noise negligible. E.R.

N87-15531*# Max-Planck-Inst. fuer Chemie, Mainz (West Germany).
OH MEASUREMENT BY LASER LIGHT ABSORPTION
D. Perner *In* NASA. Langley Research Center Future Directions for H sub x O sub y Detection Dec. 1986 p 33-34 (For primary document see N87-15528 07-46)
Avail: NTIS HC A04/MF A01 CSCL 04A

Since the first attempt to measure atmospheric hydroxyl radicals by optical absorption in 1975 (Perner et al., 1976) this method has been continuously developed further and its major obstacles and limitations are known today. The laser beam needs to be expanded in order to reduce the beam divergence. At the same time the energy density of the laser beam which produces OH via ozone photolysis is reduced to such an extent that the self-produced OH concentration ranges well below the atmospheric value. Atmospheric absorptions should be observed over a wide spectral range so that not only the OH radicals are properly identified by several rotational lines but their absorption can be corrected for interfering absorptions from other air constituents as SO2, CH2O, CS2, etc., which can be identified in a wide spectral range with more confidence. Air turbulence demands fast spectral scanning or probing on and off the absorption line. Energy requirements should be kept small in field operations. In the experiment frequency doubled dye laser pulses at 308 nm are produced. The picosecond light pulses are expected to show a smooth profile (light intensity against wavelength) which will be broadened to the required spectral width according to the uncertainty principle. The pump laser will be an optoacoustically modulated Nd:YAG laser. Author

N87-15532*# Portland Univ., Oreg.
TROPOSPHERIC HO DETERMINATION BY FAGE
T. M. Hard, R. J. OBrien, C. Y. Chan, and A. A. Mehrabzadeh *In* NASA. Langley Research Center Future Directions for H sub x O sub y Detection Dec. 1986 p 35-36 (For primary document see N87-15528 07-46)
Avail: NTIS HC A04/MF A01 CSCL 04A

In the detection of tropospheric HO by laser excited fluorescence, and alternative air-sampling method, named FAGE (Fluorescence Assay with Gas Expansion) was introduced. Here the air is expanded through a nozzle prior to excitation, in order to improve the ratio of the HO signal to the scattered, fluorescent, and photolytic backgrounds. The improvement comes from the differing pressure dependence of the intensities of these four terms, as well as the distinguishability of their temporal waveforms at low pressures when excited by a pulsed laser. HO has been excited by a YAG/dye laser. Other lasers and pumping paths may perform as well or better in this method. With FAGE, chemical modulation of the HO signal was achieved by hydrocarbon addition to the nozzle flow, converting photolytic HO from an interference to a background. Chemical calibration of the instrumental response to external HO was also achieved, by hydrocarbon decay, at HO concentrations within the ambient range. E.R.

N87-15533*# Georgia Inst. of Tech., Atlanta.
TWO-PHOTON LASER-INDUCED FLUORESCENCE DETECTION OF OH
D. D. Davis, J. D. Bradshaw, and M. O. Rodgers *In* NASA. Langley Research Center Future Directions for H sub x O sub y Detection Dec. 1986 p 37-38 (For primary document see N87-15528 07-46)
Avail: NTIS HC A04/MF A01 CSCL 04A

The TP-LIF OH sensor is based on the principle that a molecule having multiple energy states, all of which are bonding, can be pumped into the highest state with the resulting fluorescence being blue-shifted relative to all pumping wavelengths. In this way, one can successfully discriminate against virtually all noise sources in the system using long wavelength blocking filters in conjunction with solar-blind photomultiplier tubes. Thus, these systems tend to be signal limited rather than signal-to-noise limited as is true of the SP-LIF technique as well as other conventional analytical methods. The trick to achieving the above sampling scheme, with high efficiency, is in the use of high photon fluxes of short time duration. Obviously, the latter type of light source is fulfilled nicely by available pulsed lasers. From an operational point of view, however, this laser source needs to be tunable. The latter characteristic permits extremely high selectivity for the detection of a diatomic or simple polyatomic molecule by taking advantage of the high-resolution spectroscopic features of these type species. Author

N87-15534*# Ford Motor Co., Dearborn, Mich. Research Staff.
OH DETECTION BY FORD MOTOR COMPANY
Charles C. Wang *In* NASA. Langley Research Center Future Directions for H sub x O sub y Detection Dec. 1986 p 39 (For primary document see N87-15528 07-46)
Avail: NTIS HC A04/MF A01 CSCL 04A

Two different methods for detection of OH are presented: a low pressure flow cell system and a frequency modulation absorption measurement. Using conventional absorption spectroscopy, detection limits were quoted of 1,000,000 OH molecules per cu cm using a 30-minute averaging time on the ground, and a 3-hour averaging time in the air for present apparatus in use. With the addition of FM spectroscopy at 1 GHz, a double-beam machine should permit detectable absorption of and an OH limit of 100,000 per cu cm in a 30-minute averaging time. In the low pressure system on which experiments are ongoing nonexponential time behavior was observed after the decay had progressed to about 0.3 of its original level; this was attributed to ion emission in the photomultiplier. A flame source with OH present at high concentration levels was used as a calibration. It was estimated that within the sampling chamber, 400,000 OH could be measured. With a factor-of-2 loss at the sampling orifice, this means detectability of 5 to 8 x 100,000 cu cm at the present time. This could be reduced by a factor of 2 in one hour averaging time; improvements in laser bandwidth and energy should provide another factor of 2 in sensitivity. Author

N87-15535*# SRI International Corp., Menlo Park, Calif. Electro-Optics Systems Lab.
ULTRASENSITIVE DETECTION OF ATMOSPHERIC TRACE GASES USING FREQUENCY MODULATION SPECTROSCOPY
David E. Cooper *In* NASA. Langley Research Center Future Directions for H sub x O sub y Detection Dec. 1986 p 40-41 (For primary document see N87-15528 07-46)
Avail: NTIS HC A04/MF A01 CSCL 04A

Frequency modulation (FM) spectroscopy is a new technique that promises to significantly extend the state-of-the-art in point detection of atmospheric trace gases. FM spectroscopy is essentially a balanced bridge optical heterodyne approach in which

a small optical absorption or dispersion from an atomic or molecular species of interest generates an easily detected radio frequency (RF) signal. This signal can be monitored using standard RF signal processing techniques and is, in principle, limited only by the shot noise generated in the photodetector by the laser source employed. The use of very high modulation frequencies which exceed the spectral width of the probed absorption line distinguishes this technique from the well-known derivative spectroscopy which makes use of low (kHz) modulation frequencies. FM spectroscopy was recently extended to the 10 micron infrared (IR) spectral region where numerous polyatomic molecules exhibit characteristic vibrational-rotational bands. In conjunction with tunable semiconductor diode lasers, the quantum-noise-limited sensitivity of the technique should allow for the detection of absorptions as small as .00000001 in the IR spectral region. This sensitivity would allow for the detection of H2O2 at concentrations as low as 1 pptv with an integration time of 10 seconds. Author

N87-15536*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

REMOTE DETECTION OF OH

I. Stuart McDermid and James B. Laudenslager *In* NASA. Langley Research Center Future Directions for H sub x O sub y Detection Dec. 1986 p 42-43 (For primary document see N87-15528 07-46)
Avail: NTIS HC A04/MF A01 CSCL 04A

This is a remote measurement technique utilizing a XeCl excimer laser tuned to the Q sub 21 1 rotational transition of the 0-0, A-X band at 307.847 nm. A wavemeter is under development to monitor, on a pulse-to-pulse basis, both the laser lineshape and absolute wavelength. Fluorescence is detected with a multiple Fabry-Perot type filter with a spectral resolution on the order of 0.001 nm. This is tuned to the overlapping Q sub 2 2, Q sub 12 2, Q sub 2 3, and Q sub 12 3 rotational transitions at 308.986 nm. The fringe pattern from this filter is imaged using a discrete, multi-anode detector which has a photon gain of 10 to the 8th power. This permits the simultaneous monitoring of OH fluorescence, N2 and/or O2 rotational Raman scattering and broadband background levels. The use of three etalons in series provides sufficient rejection, approx. greater than 10 to the 10th power, against the laser radiation only 1.2 nm away. Author

N87-15537*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

INDIRECT DETERMINATION OF OH

Hanwant B. Singh *In* NASA. Langley Research Center Future Directions for H sub x O sub y Detection Dec. 1986 p 44-45 (For primary document see N87-15528 07-46)
Avail: NTIS HC A04/MF A01 CSCL 04A

Efforts are under way to develop indirect OH measurement techniques by utilizing tailor made reactive OH tracers to be employed in estimating OH abundance within air masses over a 100 to 1,000 km transport distance. By simultaneously releasing controlled quantities of reactive and inert tracers, both dispersion and OH abundance can be determined. When fully developed, the method will be used at all expected levels of atmospheric OH concentrations. A number of candidate reactive OH tracers were selected after a careful screening process. Laboratory work is now under way to affirm the applicability of the selected chemicals to real world conditions. Author

N87-15538*# California Univ., Irvine.

MEASUREMENT OF ATMOSPHERIC HO BY A CHEMICAL METHOD

R. Subramonia Iyer and F. Sherwood Rowland *In* NASA. Langley Research Center Future Directions for H sub x O sub y Detection Dec. 1986 p 46-49 (For primary document see N87-15528 07-46)
Avail: NTIS HC A04/MF A01 CSCL 04A

The parameters for a chemical technique can be outlined from the following set of desirable goals: (1) sufficient conversion of tracer species A to product B that B can be measured quantitatively in the presence of A and a great excess of air; (2) specificity of reaction such that A is converted to B only by reaction with HO; and (3) sufficient sensitivity for detection that the ambient concentration of HO is not seriously perturbed by the presence of A and B. This proposed study involves finding a chemical reaction specific enough for OH, and a measurement of the product formed. What one wants is a rate constant of about 10 to the -10th power cu cm/s, so that 0.1 percent of the OH will be converted in 100 s. Laboratory studies are needed to find a reaction which will fill this bill, yielding a product in quantity sufficient for precise measurement. This is an extremely fast constant and the search may be difficult. Again there is a question of perturbing the local environment, while still providing a sensitive measurement. Also the temperature and pressure dependence of the reaction rate is a complicated function for many of these species (that is, one must use a RRKM or Troe-based picture), and must be taken into account. E.R.

N87-15539*# Argonne National Lab., Ill.

THE DETERMINATION OF THE GLOBAL AVERAGE OH CONCENTRATION USING A DEUTEROETHANE TRACER

Charles M. Stevens and Ralph Cicerone (National Center for Atmospheric Research, Boulder, Colo.) *In* NASA. Langley Research Center Future Directions for H sub x O sub y Detection Dec. 1986 p 50-51 (For primary document see N87-15528 07-46)
Avail: NTIS HC A04/MF A01 CSCL 04A

It is proposed to measure the decreasing global concentration of an OH reactive isotopic tracer, G sub 2 D sub 6, after its introduction into the troposphere in a manner to facilitate uniform global mixing. Analyses at the level of 2 x 10 to the -19th power fraction, corresponding to one kg uniformly distributed globally, should be possible by a combination of cryogenic absorption techniques to separate ethane from air and high sensitivity isotopic analysis of ethane by mass spectrometry. Aliquots of C sub 2 D sub 6 totaling one kg would be introduced to numerous southern and northern latitudes over a 10 day period in order to achieve a uniform global concentration within 3 to 6 months by the normal atmospheric circulation. Then samples of air of 1000 l (STP) would be collected periodically at a tropical and temperate zone location in each hemisphere and spiked with a known amount of another isotopic species of ethane, C-13 sub 2 H sub 6, at the level of 10 to the -11th power mole fraction. After separation of the ethanes from air, the absolute concentration of C sub 2 D sub 6 would be analyzed using the Argonne 100-inch radius mass spectrometer. Author

N87-15540*# Denver Univ., Colo.

PEROXY RADICAL DETECTION BY CHEMICAL AMPLIFICATION (PERCA)

D. H. Stedman *In* NASA. Langley Research Center Future Directions for H sub x O sub y Detection Dec. 1986 p 52-53 (For primary document see N87-15528 07-46)
Avail: NTIS HC A04/MF A01 CSCL 04A

Important reactions of atmospheric free radicals are the chain oxidation of NO and CO. Thus: H2O + NO yields OH + NO2; OH + CO yields H + CO2; H + O2 + M yields HO2 + M. In most models, the need to know the free radical concentration could also be described as the need to know the rate of the above oxidation chain in the atmosphere. It is the total rate of this chain (also carried by RO2 and RO) which was measured using the PERCA. The PERCA is thus essentially a RO sub X meter. The PERCA works by adding excess CO (10%) and NO (5ppm) to a stream of air and measuring the NO2 produced after 3s of reaction time. Since other processes produce NO2, the chain reaction is modulated by switching the CO for N2. The chain length is limited by the reaction OH + NO yields HONO and is modeled to be somewhat over 1000. Measured chain lengths agree with the modeled numbers. Author

N87-15541*# National Center for Atmospheric Research, Boulder, Colo.

FLUOROMETRIC METHOD FOR THE DETERMINATION OF GAS-PHASE HYDROGEN PEROXIDE

Gregory L. Kok and Allan L. Lazrus *In* NASA. Langley Research Center Future Directions for H sub x O sub y Detection Dec. 1986 p 54-55 (For primary document see N87-15528 07-46)

Avail: NTIS HC A04/MF A01 CSCL 04A

The fluorometric gas-phase hydrogen peroxide procedure is based on the technique used by Lazrus et. al. for the determination of H2O2 in the liquid phase. The analytical method utilizes the reaction of H2O2 with horseradish peroxidase and p-hydroxphenylacetic acid (POPHA) to form the fluorescent dimer of POPHA. The analytical reaction responds stoichiometrically to both H2O2 and some organic hydroperoxides. To discriminate H2O2 from organic hydroperoxides, catalase is used to preferentially destroy H2O2. Using a dual-channel flow system the H2O2 concentration is determined by difference. Author

N87-15542*# Portland Univ., Oreg.
TROPOSPHERIC HO2 DETERMINATION BY FAGE
R. J. OBrien, T. M. Hard, C. Y. Chan, and A. A. Mehrabzadeh *In* NASA. Langley Research Center Future Directions for H sub x O sub y Detection Dec. 1986 p 56-57 (For primary document see N87-15528 07-46)
Avail: NTIS HC A04/MF A01 CSCL 04A

The detection efficiency is greatest at low pressures, where the subsequent removal of the HO product by the NO reagent (via HO + NO + M yields HONO + M) is relatively slow. Moreover, nozzle expansion of the air from ambient to low pressures produces a turbulent zone that assists in mixing the reagent with the sample. If the HO product is observed by laser-excited fluorescence, then the other advantages of low-pressure detection by FAGE (Fluorescence Assay with Gas Expansion) also apply. The FAGE instrumental response was calibrated to external HO2 by observing NO decay in the photolysis of HO-CH2O mixtures and by choosing conditions in which HO2 + NO is the only significant NO destruction path. HO2 was determined in urban air. Author

N87-15543*# Unisearch Associates, Inc., Concord (Ontario).
TUNABLE-DIODE LASER ABSORPTION SPECTROMETRY
H. I. Schiff *In* NASA. Langley Research Center Future Directions for H sub x O sub y Detection Dec. 1986 p 58-59 (For primary document see N87-15528 07-46)
Avail: NTIS HC A04/MF A01 CSCL 04A

Tunable-diode laser absorption spectrometry (TDLAS) affords a number of advantages for atmospheric measurements. It is a universal method, applicable, in principle, to all gases of atmospheric interest. Because of its extremely high spectral resolution it provides unequivocal identification of the target species, with no interferences from other gases. It provides real-time, in situ measurements with time resolutions better than 1 minute. The sensitivity of the current TDLAS system is marginally capable of measuring HO2. This species exists in the troposphere at concentrations which are up to 2 orders of magnitude higher than those of HO and, in addition, is much less susceptible to removal by the surfaces of the instrument and its sampling system. HO2 is an important HO sub x species in its own right but can also give direct information on the HO concentration by virtue of the rapid partitioning between these two species. The addition of the high-frequency modulation technique to the TDLAS system would ensure its ability to measure HO2 under most atmospheric conditions. The ability of the TDLAS to measure hydrogen peroxide (H2O2) in the ambient atmosphere was also demonstrated. H2O2 measurements give a clear indication of HO sub x mixing ratios and are also important as a photolytic source of HO and as an important oxidant for other atmospheric consitituents such as SO2. Author

N87-15544# European Space Agency, Paris (France).
PROCEEDINGS OF AN INTERNATIONAL SATELLITE LAND-SURFACE CLIMATOLOGY PROJECT (ISLSCP) CONFERENCE
Erica Rolfe, ed. and Bruce Battrick, ed. May 1986 611 p Conference held in Rome, Italy, 2-6 Dec. 1985; sponsored by Accademia dei Lincei, CNES, Commission of the European Communities, COSPAR, European Association of Remote Sensing Labs., ESA, International Association for Meteorology and Atmospheric Physics, Joint Scientific Committee of the World Climate Research Program. NASA, and United Nations Environmental Program Original contains color illustrations
(ESA-SP-248; ISSN-0379-6566; ETN-86-98248) Avail: NTIS HC A99/MF A01

The methodology to derive physical characteristics of the Earth surface and of the Earth surface atmosphere interaction from radiances measured by various satellite sensors was developed. The information inferred by these methods was validated and the application was guided in climate studies of these data. The climate studies addressed are climate modelling and climate diagnostics including retrospective studies of changes in the land surface characteristics. Essential qualities which govern the surface atmosphere interaction are surface albedo, surface temperature, surface net radiation flux, surface roughness, upper layer soil moisture, vegetation cover and its capacity to extract water out of deeper layers of the soil, information about inland water extents, and evapotranspiration. For individual titles, see N87-15545 through N87-15629.

N87-15545# Ecole Normale Superieure, Paris (France).
TWO YEARS OF THE INTERNATIONAL SATELLITE LAND-SURFACE CLIMATOLOGY PROJECT (ISLSCP)
S. I. Rasool *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p xxv-xxvii (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

A project to develop methodologies for converting satellite measured radiances into quantitative data concerning the Earth's surface is described. It includes field experiments for validation of the derived quantities by means of ground based measurements and, later on, continuous quality control by selected, well equipped, so-called anchor stations; and application studies, to demonstrate the applicability of satellite data to problems in selected geographical areas, including the use of archived data for retrospective studies. ESA

N87-15546# World Meteorological Organization, Geneva (Switzerland). Joint Planning Staff for WCRP.
WCRP (WORLD CLIMATE RESEARCH PROGRAM) ON LAND SURFACE PROCESSES AND CLIMATE: OBJECTIVES AND REQUIREMENTS
V. P. Meleshko *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p xxix-xxxii (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

The World Climate Research Program (WCRP) program on land surface processes and climate deals with development of parameterization methods for land surface and hydrological processes, data collection efforts to obtain global climatology of heat and water budget components near the surface needed for validation of climate models and sensitivity studies aimed at evaluating the response of the atmosphere to the large-scale anomalies in land surface forcings. The Hydrological and Atmospheric Pilot Experiment is presented. The WCRP Project on Global Land Surface Data and its relationship with the International Satellite Land Surface Climatology Project are discussed. ESA

N87-15547# University Coll., Dublin (Ireland). Dept. of Civil Engineering.
HYDROLOGIC MODELS OF LAND SURFACE PROCESSES
James C. I. Dooge *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 3-16 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

The role of soil moisture in climate modeling, particularly those aspects to which remote sensing can make a significant contribution, is reviewed. The main features of models of soil water storage and movement at the microscale of a repesentative local volume, the mesoscale of an experimental plot, and the macroscale of a catchment are summarized. Soil moisture modeling in general circulation models is discussed, together with uses of remote sensing in the improvement of such techniques. ESA

N87-15548# Canadian Climate Centre, Sidney (British Columbia). Inst. of Ocean Sciences.

THE ATMOSPHERIC BOUNDARY LAYER AND ITS PARAMETERIZATION c43

Gordon McBean *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 17-22 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

Atmospheric boundary layer parameterization in general circulation models (GCM) is discussed. Parameterization depends on the vertical resolution of the GCM. Low vertical resolution models can use a form of Rossby number similarity theory, while high resolution models with a level in the lowest 50 m can use Monin-Obukhov similarity theory. Each approach has its inherent uncertainties. All parameterization methods suffer from difficulties in treating high vegetation effects (e.g., forests) and the probable dissimilarity of the surface transfer processes over vegetation. ESA

N87-15549# Princeton Univ., N. J. Geophysical Fluid Dynamics Lab.

BOUNDARY LAYER PARAMETERIZATIONS AND LAND SURFACE PROCESSES IN GFDL GCMS

C. T. Gordon *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 23-36 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

General circulation model (GCM) parameterizations of subgrid scale physical processes are reviewed. The E layer physics is a static stability-dependent parameterization of turbulent vertical mixing in the surface boundary layer, planetary boundary layer, and free atmosphere. The optional F physics is similar to E, but employs the Arakawa-Schubert cumulus parameterization instead of moist convective adjustment. A specification of land surface albedo based upon CLIMAP data and a parameterization of snow albedo that depends on land surface type, snow melt, and snow depth are being tested. A water bucket model of the land surface hydrology is used. The impact of E and F physics on one month GCM forecasts and the results of a GCM soil moisture sensitivity experiment are discussed. ESA

N87-15550# Cornell Univ., Ithaca, N.Y. School of Civil and Environmental Engineering.

EVOLVING IDEAS ON THE BOUNDARY LAYER CONCERNING REGIONAL EVAPORATION

Wilfried Brutsaert *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 37-42 (For primary document see N87-15544 07-46)
(Grant NSF ATM-81-15713)
Avail: NTIS HC A99/MF A01

The importance of the atmospheric boundary layer for a better understanding and parameterization of land surface processes at the regional scale is discussed. Bulk transfer formulations, simple slab approaches, and the dissimilarity between sensible and latent heat transport are reviewed. ESA

N87-15551# Japan Meteorological Agency, Tokyo. Numerical Prediction Div.

LAND-SURFACE PARAMETERIZATION IN THE JAPAN METEOROLOGICAL AGENCY (JMA) OPERATIONAL SPECTRAL MODEL

K. Tada *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 43-52 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

Land surface parameterization in a hemispheric spectral model with the resolution of 12 levels in the vertical and triangular 42 wavenumber truncation in the horizontal is described. Parameterization is formulated on the bulk aerodynamical assumption. The ground temperature is predicted with the diurnal change of solar radiation. Sensible and latent heat fluxes, and ground temperature were investigated. It is found that evaporation from land in the midlatitudes is not sufficient compared with the observations in summer. Ground temperature has a tendency to become higher with the forecast. An impact test of ground wetness was made using analysis data. It appears that the ground wetness has an influence on 8-day forecast in the model in summer. ESA

N87-15552# European Centre for Medium-Range Weather Forecasts, Reading (England).

TREATMENT OF LAND-SURFACE PROPERTIES IN THE ECMWF MODEL

C. A. Blondin *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 53-60 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

The treatment of land-surface processes in a general circulation model is described and results of medium and long range integrations are presented. Sensitivity studies show a distinct response of the atmosphere to different surface forcings, even in medium range weather forecasts. ESA

N87-15553# Direction de la Meteorologie Nationale, Paris (France).

THE INITIALIZATION AND USE OF PROGNOSTIC LAND-SURFACE VALUES IN THE FRENCH OPERATIONAL FORECAST SYSTEM

B. Urban, J. Hoffman, J. Coiffier, and J. F. Geleyn *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 61-64 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

A method for analyzing weather forecasting variables which are not measured, such as surface temperature or surface humidity, is presented. It is assumed that the differences between these variables and the associated guess is a linear function of the differences between measured quantities such as screen level temperature or humidity and the associated guess. The results of the method and justification of it are given. ESA

N87-15554# Centre de Recherches en Physique de l'Environnement, Issy-les-Moulineaux (France).

MODELISATION OF EVAPOTRANSPIRATION AND SOIL AVAILABLE WATER OVER AN AGRICULTURAL REGION APPLICABLE FOR REMOTE SENSING c43

O. Taconet *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 65-71 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

It is shown that in evaluating evapotranspiration over an agricultural region, serious errors can arise by neglecting the influence of vegetation. Using Dardorff's formalism (1978), the single midday temperature is sufficient over dense canopies for obtaining the bulk canopy resistance to evaporation, from which the surface fluxes are derived. The two methodologies (with and without vegetation) are tested by examining the evolution of simulated fluxes (using NOAA-7 images) and the measured surface fluxes during a 10 day period of soil drying. Surface heat flux is effectively captured by the inversion method using measured radiative temperatures and a vegetation parameterization. The inversion methodology with bare soil formalism reveals inferior performance, especially for great sensible heat flux, when applied to a wheat canopy. However, while the agreement between measured and modeled sensible heat fluxes support the vegetation formalism, more field measurements are needed in order to determine if this modeling is valid for different situations and crops. ESA

N87-15555# Oregon State Univ., Corvallis. Dept. of Atmospheric Sciences.

A BOUNDARY LAYER AND SOIL MOISTURE FOR USE IN GCMs

L. Mahrt and H.-L. Pan *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 73-75 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

A formulation for the soil and atmospheric boundary layer for use in general circulation models is proposed. It is found that

typical variations of surface evaporation exerts a more important influence on boundary layer evolution than the details of the boundary layer formulation. Results for 90-day numerical iterations of the drying season are shown. As the soil moisture decreases below a critical value and the actual evaporation decreases below the potential rate, boundary layer growth is significantly enhanced. ESA

N87-15556# Meteorological Office, Bracknell (England).
ISSUES CONCERNING THE EVALUATION OF EFFECTIVE SURFACE ROUGHNESS OF HETEROGENEOUS TERRAIN
D. J. Carson *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 77-82 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

The concept of effective areal surface roughness length is defined, and three aspects of the parameterization of surface shearing stress over a heterogeneous area are discussed: the relation of surface roughness length to terrain type; areal averaging of drag coefficients and roughness lengths; and parameterization of orographic influences. Views on whether surface or geostrophic drag coefficients should be averaged to give the areal surface stress are examined. Guidance for parameterizations in numerical weather forecasting and atmospheric general circulation models is emphasized. ESA

N87-15557*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PARAMETERIZATION OF ALBEDO, THERMAL INERTIA, AND SURFACE ROUGHNESS OF DESERT SCRUB/SANDY SOIL SURFACE
J. Otterman (Tel-Aviv Univ., Isreal) and M. McCumber *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 87-89 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01 CSCL 08G

Spectral albedo, A sub n, for the direct solar beam is defined as A sub n (r sub i,s, theta sub 0) = r sub i exp(-s tan theta sub 0)[1-I(s)] where I(s) is the integral over all reflection angles describing the interception by the absorbing plants of the flux reflected from the soil, r sub i soil reflectance, assumed Lambertian, S the projection on a vertical plane of plants per unit surface area, and theta sub 0 is the solar zenith angle. Hemispheric reflectance for the direct solar beam equals 1-I(s) times the reflectance to the zenith. The values of s of 0.1, 0.2, and 0.3 respectively quantify sparse, moderately dense, and very dense desert scrub. Thin plants are assumed to be of negligible thermal inertia, and thus directly yield the absorbed insolation to the atmosphere. Surface thermal inertia is therefore effectively reduced. The ratio of surface roughness height to plant height is parameterized for sparse, moderately dense, and very dense desert-scrub as a function of s based on data expressing the dependence of this ratio on plant silhouette. ESA

N87-15558*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A BRIEF DESCRIPTION OF THE SIMPLE BIOSPHERE MODEL (SIB)
P. J. Sellers (Maryland Univ., College Park), Y. Mintz (Maryland Univ., College Park), and Y. C. Sud *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 91-106 (For primary document see N87-15544 07-46)
(Grants NAG5-492; NAG5-383; NSF ATM-83-09767)
Avail: NTIS HC A99/MF A01 CSCL 04A

A biosphere model for calculating the transfer of energy, mass, and momentum between the atmosphere and the vegetated surface of the Earth was designed for atmospheric general circulation models. An upper vegetation layer represents the perennial canopy of trees or shrubs, a lower layer represents the annual ground cover of grasses and other herbacious species. The local coverage of each vegetation layer may be fractional or complete but as the individual vegetation elements are considered to be evenly spaced, their root systems are assumed to extend uniformly throughout the entire grid-area. The biosphere has seven prognostic physical-state variables: two temperatures (one for the canopy and one for the ground cover and soil surface); two interception water stores (one for the canopy and one for the ground cover); and three soil moisture stores (two of which can be reached by the vegetation root systems and one underlying recharge layer into and out of which moisture is transferred only by hydraulic diffusion). ESA

N87-15559# Delaware Univ., Newark. Center for Climatic Research.
A REPRESENTATION OF THE TERRESTRIAL BIOSPHERE FOR USE IN GLOBAL CLIMATE STUDIES
C. J. Willmott and K. Klink *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 109-112 (For primary document see N87-15544 07-46)
(Grant NSF ATM-83-06946)
Avail: NTIS HC A99/MF A01

A data set which characterizes the space-time variability in climatically-important facets of the terrestrial biosphere is described. Most of the data are associated with natural vegetation as mapped by Kuchler but soil parameters are also given. The data were resolved to a 1 deg of latitude by 1 deg of longitude grid to be used by global climate models. ESA

N87-15560# Eidgenoessische Technische Hochschule, Zurich (Switzerland). Dept. of Geography.
PARAMETERIZATION OF GLACIERIZATION FOR A CLIMATE MODEL
A. Ohmura, P. Kasser, and M. Funk *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 113-123 (For primary document see N87-15544 07-46)
(Grants SNSF-2.081-0.81; SNSF-2.890.83)
Avail: NTIS HC A99/MF A01

A parameterization of glacierization by calculating the equilibrium line altitude of a glacier is proposed. The essential meanings attached to the glacier equilibrium line are demonstrated with field data. A simple and realistic parameterization for the equilibrium line altitude with respect to the winter mass balance on the equilibrium line altitude and the free atmosphere temperature for the summer at the height equivalent to the equilibrium line altitude is proposed. Fourty-seven glaciers are selected to calculate the regression surface. ESA

N87-15561# National Center for Atmospheric Research, Boulder, Colo.
GCM SENSITIVITY STUDIES: IMPLICATIONS FOR PARAMETERIZATIONS OF LAND PROCESSES
Robert E. Dickinson *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 127-129 Sponsored by NSF (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

The roles of soils versus vegetation in climate models are discussed. Models demonstrate that drastic changes in land-surface properties cause large changes in climate patterns and especially rainfall over land. Subgrid-scale variations of surface properties need to be described and parameterized. A study of the effects of deforestation of Amazonia shows warmer and drier conditions at the surface during the dry season, but no obvious changes in rainfall. ESA

N87-15562# Liverpool Univ. (England). Dept. of Geography.
ZERO-D SENSITIVITY STUDIES WITH THE NCAR CCM LAND SURFACE PARAMETERIZATION SCHEME
A. Henderson-Sellers, M. F. Wilson (National Center for Atmospheric Research, Boulder, Colo.), and R. E. Dickinson *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 131-133 (For primary document see N87-15544 07-46)

Avail: NTIS HC A99/MF A01

The boundary package of a version of the NCAR Community Climate Model was run as a stand alone zero-dimensional model. Soil data and a soil parameterization scheme were added to the vegetation parameterization. Sensitivity experiments, including conditions representative of a low latitude evergreen forest, a sand desert, a high latitude coniferous forest, high latitude tundra, and prairie grassland were undertaken. The land surface scheme shows the greatest sensitivity to soil texture variation, particularly to changes in hydraulic conductivity and diffusivity. ESA

N87-15563# Centre National de Recherches Meteorologiques, Toulouse (France). Unite Dynamique du Climat.

SENSITIVITY OF THE ANNUAL CYCLE SIMULATED BY A GENERAL CIRCULATION MODEL (GCM) TO A CHANGE IN LAND SURFACE ALBEDO

Serge Planton *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 135-142 (For primary document see N87-15544 07-46)

Avail: NTIS HC A99/MF A01

Two sets of 2 yr of simulation were performed with a global circulation model to measure the impact of a land surface albedo change on climate. In the control case, the albedo is given by Schutz and Gates (1971), and in the perturbed case, it was increased by 0.1 over a region including Sahara and northern Sahel. In both cases, the soil water content is interactive. Locally, the results corroborate a mechanism similar to the one postulated by Charney (1975) associating subsidence and precipitation decrease. However, high dissymmetries in space and time appear, pointing out other mechanisms which often regulate it. A significant response over South-East Asia during winter is discussed, by means of theory of the Rossby waves propagation. ESA

N87-15564# Meteorological Office, Bracknell (England).

THE SENSITIVITY OF THE UK METEOROLOGICAL OFFICE ATMOSPHERIC GENERAL CIRCULATION MODEL TO RECENT CHANGES TO THE PARAMETERIZATION OF HYDROLOGY c43

David A. Warrilow *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 143-149 (For primary document see N87-15544 07-46)
(Contract CEC-CL.113.UK(H))

Avail: NTIS HC A99/MF A01

A hydrological scheme was included in an 11-Layer atmospheric general circulation model (AGCM) to replace a simple bucket model. It includes a term for surface runoff and one for gravitational drainage. The two schemes are compared in an AGCM experiment and reveal heightening of the differences between wet and dry areas. Experiments comparing the behavior of the new scheme with fine and coarse soils show that despite large variations in soil moisture, differences in runoff and evaporation are not as large as expected. ESA

N87-15565# Meteorological Research Inst., Yatabe (Japan).

THE SENSITIVITY EXPERIMENT TO LAND-SURFACE BOUNDARY CONDITIONS WITH THE METEOROLOGICAL RESEARCH INSTITUTE GENERAL CIRCULATION MODEL (MRI GCM)

K. Yamazaki *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 151-157 (For primary document see N87-15544 07-46)

Avail: NTIS HC A99/MF A01

Sensitivity to land-surface boundary conditions of a general circulation model, where model R uses the prescribed ground wetness and Posey and Clapp's (1964) albedo, and model I uses the interactive ground wetness and the constant surface albedo over bare land was studied. The simulated differences between R and I for monthly mean values in June are investigated. Heat and water balance is studied over the globe and several selected regions. Model I produces larger precipitation and evaporation through the ground hydrological process over land compared with the model R. Differences in large-scale circulation are also noted. ESA

N87-15566# Meteorological Office, Bracknell (England).

INDICATIONS OF THE SENSITIVITY OF EUROPEAN CLIMATE TO LAND USE VARIATIONS USING A ONE-DIMENSIONAL MODEL c47

David A. Warrilow *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 159-166 (For primary document see N87-15544 07-46)
(Contract CEC-CL.113.UK(H))

Avail: NTIS HC A99/MF A01

A one dimensional atmospheric model is used to simulate local climate. Large scale advection is treated statistically, allowing the surface to be forced with realistic, time varying atmospheric conditions. Results from model integrations with different soil and vegetation types are presented. The sensitivity of the local climate to model land surface parameters which are soil and vegetation dependent is emphasized. Application of satellite data is discussed. ESA

N87-15567# Academia Sinica, Beijing (China). Inst. of Atmospheric Physics.

CLIMATIC EFFECT OF SNOWFALL ANOMALLY IN MID-HIGH LATITUDES IN A ONE-DIMENSIONAL AIR-LAND MODEL c47

Jin-Jun Ji *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 167-170 (For primary document see N87-15544 07-46)

Avail: NTIS HC A99/MF A01

The snowmelt process and the local climatic effect of snowfall anomaly in mid-high latitudes were investigated with a one-dimensional air-land coupled model, which involves heat and water exchanges between the atmosphere and the sublayer of soil. The computed temperature variation in each latitudinal belt is well consistant with the seasonal change of snow cover over the continents in the Northern Hemisphere. The results from snowfall anomaly experiments indicate that the climatic effect of snowfall is realized through the land-surface processes and would last for a couple of months. ESA

N87-15568# Meteorological Office, Bracknell (England).

ON CHANGES IN SOIL MOISTURE IN CO2 CLIMATE STUDIES

J. F. B. Mitchell *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 171-173 (For primary document see N87-15544 07-46)

Avail: NTIS HC A99/MF A01

Simulated changes in soil moisture in numerical studies of the effect of CO2 on climate are assessed. Reasons for discrepancies between the simulated changes are explored. Although the changes may appear inconsistent, the same physical mechanisms (for example, earlier snowmelt) may occur in each model. The effect of a given mechanism depends on the simulation of the unperturbed climate. The simulation of the unperturbed climate is likely to be degraded if the atmospheric model has inadequate horizontal resolution, or the sea surface temperature is computed using a simplified ocean model. To avoid these problems, several relatively high resolution CO2 sensitivity studies with prescribed sea surface temperatures were carried out, all of which suggest a drying of the northern midlatitude continents in summer. ESA

N87-15569# Meteorological Office, Bracknell (England).

REMOTE SENSING IDENTIFIED IN CLIMATE MODEL EXPERIMENTS WITH HYDROLOGICAL AND ALBEDO CHANGES IN THE SAHEL c43

P. R. Rowntree and A. B. Sangster *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 175-183 (For primary document see N87-15544 07-46)

Avail: NTIS HC A99/MF A01

Mechanisms by which changes in the land surface may affect climate in lower latitudes are discussed and general circulation model experiments are reviewed. Albedo and surface moisture availability appear to be the most important factors. Results of experiments designed to assess the effects on rainfall of variations in model land surface properties in the Sahel, such as could follow from a loss of vegetation in the region are presented. These

changes led to decreases in rainfall of similar magnitude to those observed during the Sahel drought of the last 15 to 20 yr. However there is only a little quantitative information readily available for assessing whether such changes have actually occurred. There is a need for regular satellite monitoring of relevant land surface characteristics with extension as far into the past as possible.ESA

N87-15570# World Meteorological Organization, Geneva (Switzerland). Hydrology and Water Resources Dept.
GLOBAL RUNOFF DATA SETS AND USE OF GEOGRAPHIC INFORMATION SYSTEMS **c43**
J. Nemec *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 185-189 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

Time series and other observational data sets on meteorological (climatological) and related processes were collected during the Global Atmospheric Research Program and those of most use for the scientists deposited in World Data Centers. The World Climate Program continues in this path. With the development of general circulation models (GCM) and their coupling with models of land surface processes, a much larger and integrated data base will be necessary. The surface and groundwater hydrology data present special problems of integration. The differences between GCM and hydrological concepts of runoff and relevant data are discussed. Possible alternatives of architecture and computerized supports for an integrated land surface processes data base such as geographic information systems are described and solutions feasible within existing resources are proposed. ESA

N87-15571*# National Aeronautics and Space Administration. Goddard Inst. for Space Studies, New York, N.Y.
DATA NEEDS AND DATA BASES FOR CLIMATE STUDIES
Elaine Matthews *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 191-203 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01 CSCL 04A

Two complementary global digital data bases of vegetation and land use, compiled at 1 deg resolution from published sources for use in climate studies, are discussed. The data bases were implemented, in several individually tailored formulations, in a series of climate related applications including: land-surface prescriptions in three-dimensional general circulation models, global biogeochemical cycles (CO2, methane), critical-area mapping for satellite monitoring of land-cover change, and large-scale remote sensing of surface reflectance. The climate applications are discussed with reference to data needs, and data availability from traditional and remote sensing sources. ESA

N87-15572# Osnabrueck Univ. (West Germany). General Ecology Group.
EVALUATION OF CLIMATE RELEVANT LAND SURFACE CHARACTERISTICS FROM REMOTE SENSING **c43**
G. Esser and H. Lieth *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 205-211 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

Land surface characteristics visual evaluation methods in remote sensing are investigated. Discrimination of vegetation formations and anthropogenically influenced communities is discussed. Land use changes in South America were evaluated, showing a mean annual increase of cleared areas of 9500 sq km. ESA

N87-15573*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
REMOTE SENSING OF LAND-SURFACE TEMPERATURE FROM HIRS/MSU DATA
M. T. Chahine (Jet Propulsion Lab., California Inst. of Tech., Pasadena), R. Haskins, J. Susskind, and D. Reuter *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 215-223 Original contains color illustrations (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01 CSCL 04B

A relaxation algorithm which permits meteorological parameters to be obtained from satellite data, without a priori assumptions about the properties of the other unknowns in the field of view, was developed. Atmospheric temperature profiles, atmospheric humidity, cloud cover, cloud top height, cloud top temperature, sea-surface temperature, land-surface temperature, snow cover, and ice cover are derived. Simultaneous determination of atmospheric and surface thermal structure and the cloud distribution provides information on heat sources and sinks, storage rates, and transport phenomena in the atmosphere. Such information is critical in determining the driving mechanisms for motions in the atmosphere and oceans and in improving numerical weather prediction. ESA

N87-15574# Freie Univ., Berlin (West Germany). Inst. fuer Meteorologie.
SURFACE TEMPERATURE FROM AVHRR AND TOVS FROM THE METEOROLOGICAL SATELLITE NOAA 9 **c47**
H. Billing *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 225-234 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

Representative values for surface temperatures on a climatological scale are derived from AVHRR data of NOAA satellites. Weekly maximum temperature charts and day by day mosaics are evaluated. The atmospheric influence is determined from the difference between channel 4 and channel 5. The peaks in the frequency distributions of temperature values for the grid areas are fitted by Gaussian distributions. The rising edge of the warmest distribution is nearly independent of the fitting range and can be used as representative surface radiation temperature. Results are compared with TOVS data and ship measurements for test boxes. ESA

N87-15575# National Oceanic and Atmospheric Administration, Washington, D. C. National Environmental Satellite Data and Information Service.
SURFACE RADIATION BUDGET FOR CLIMATE APPLICATIONS
G. Ohring *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 237-243 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

The Workshop on Surface Radiation Budget (SRB) for Climate Applications was held in Columbia, Maryland, 18 to 21 June 1985. Objectives were to: define the uses and requirements for SRB, review satellite-based methods for determining SRB, review procedures for validation of satellite SRB determinations, evaluate approaches to data set development, and recommend directions for future research. The SRB information is needed for diagnostic studies, climate model boundary conditions, model validation, process studies, and monitoring climatic change. It appears possible to determine monthly mean insolation from the visible radiance observations of geostationary meteorological satellites to within 5%. Existing surface stations for validating satellite SRB determinations are adequate for insolation over some continental regions but inadequate for most tropical areas; only a few stations measure longwave radiation. A project to determine SRB globally from satellites, with initial priority on insolation over the tropical oceans for the Tropical Ocean Global Atmosphere research program, was proposed. ESA

N87-15576# Cologne Univ. (West Germany). Inst. fuer Geophysik und Meteorologie.
INFERENCE OF THE SHORTWAVE RADIATION AT GROUND FROM INTERNATIONAL SATELLITE CLOUD CLIMATOLOGY PROJECT (ISCCP) DATA SETS
M. Rieland, A. Gratzki, and E. Raschke *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 245-250 (For primary document

see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

A method which enables the determination of the incoming solar radiation reaching the ground by evaluation of satellite data with a mean accuracy of the monthly averages of 110 J/sq cm (spatial resolution: 5 sq km, spatial data density: 30 km in subsatellite point) was developed. Because the method can be easily applied to data sets of different geostationary satellites (so far METEOSAT and GMS) it is feasible to prepare maps of global radiation over the entire globe. For this, the B3-dataset of the International Satellite Cloud Climatology Project can be used. ESA

N87-15577# Universite des Sciences et Techniques de Lille (France). Lab. d'Optique Atmospherique.
SOLAR IRRADIANCE AT THE EARTH'S SURFACE FROM NOAA SATELLITES
B. Bonnel, J. C. Buriez, and Y. Fouquart *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 251-255 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

Factors important in the derivation of the surface short wave radiation budget from satellite data, the degree of sophistication necessary in the inversion procedure, and the degree of accuracy obtainable in the best practical conditions are discussed. A model relating atmospheric transmittance and the normalized satellite measured brightness is used with a reference midlatitude summer atmosphere. Insufficient knowledge of the state of the atmosphere (especially aerosol effects) is the main source of uncertainty. ESA

N87-15578# National Center for Atmospheric Research, Boulder, Colo.
DOWNWARD LONGWAVE RADIATION AT THE SURFACE IN CLEAR-SKY ATMOSPHERES: COMPARISONS OF MEASURED, SATELLITE-DERIVED, AND CALCULATED FLUXES
Jean-Jacques Morcrette and Pierre-Yves Deschamps (Centre National d'Etudes Spatiales, Toulouse, France) *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 257-261 Sponsored by NSF and Programme National d'Etude de la Dynamique du Climat (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

Downward longwave radiation at the surface in clear sky atmospheres is retrieved from regression equations using outgoing longwave radiances measured in channels of a temperature sounder. This method is applied to NOAA satellite infrared sounder radiances stored in the NEPHOS file. Downward longwave fluxes derived from satellite measurements are compared to fluxes measured in February, April, and July at three ground stations. Fluxes computed from collocated radiosoundings and large scale fields of temperature and humidity analyzed at ECMWF are also compared. Discrepancies between results of the different approaches are discussed. ESA

N87-15579# Universite Catholique de Louvain (Belgium). Inst. d'Astronomie et de Geophysique.
ESTIMATION OF SURFACE ALBEDO USING SATELLITE DATA. A SIMPLE FORMULATION FOR ATMOSPHERIC EFFECTS c43
J. L. Melice *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 263-265 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

Using a short wave radiative transfer model, a simple formulation (a set of graphical representations) to help eliminate the effects of large aerosol amounts on measurements of surface albedo from LANDSAT multispectral scanner data was derived. Monitoring of surface reflectivity over large areas using the model may be performed after determining the spectral reflectivity of calibration areas from ground truth observations. The total optical depth over the calibration area may then be determined and, after assuming that the aerosol concentration is laterally homogeneous, this optical depth may be used to recover the albedo of large surfaces surrounding the calibration area. Limitations of the method are outlined. ESA

N87-15580# Tromsoe Univ. (Norway). Auroral Observatory.
ON THE INFLUENCE OF SURFACE CHARACTERISTICS FROM SATELLITE RADIATION MEASUREMENTS
Knut Stamnes *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 267-369 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

A reliable and efficient discrete ordinate method to solve the radiative transfer equation for solar and terrestrial radiation was developed. The model treats Rayleigh scattering, gaseous absorption/emission, scattering and absorption/emission by cloud droplets, and includes the surface conditions. In addition to bulk radiative properties such as direct and diffuse fluxes, the complete angular distribution of the intensity can also be calculated as required for applications to remote sensing from satellites. Model application to the inference of surface characteristics from satellite radiation measurements is discussed. ESA

N87-15581# Technische Univ., Munich (West Germany). Inst. fuer Meteorologie.
CLEAR LAND ANISOTROPY CONVERSION FACTORS: A COMPARISON OF THEORETICAL AND EXPERIMENTAL RESULTS
Peter Koepke *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 271-276 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

Factors to convert radiances, measured by satellite in the solar spectral range, into hemispherical radiant exitances (flux densities) at the top of the atmosphere for cloudfree Earth atmosphere models are calculated. The calculations are based on measured land surface reflection functions and take into account multiple scattering and absorption by atmospheric gases and aerosols. The resulting conversion factors are compared with those derived from Nimbus-7 Earth radiation budget for clear land. General agreement is very good. The variation of the factors with surface and atmospheric conditions allows one to estimate the uncertainty in the derived exitance when the average clear land factors are applied. The factors and their variability increase with solar zenith distance. ESA

N87-15582# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Physik der Atmosphaere.
DETERMINATION OF THE ALBEDO OF INHOMOGENEOUS LAND SURFACES
K. T. Kriebel *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 277-278 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

A method to obtain the required accuracy of an area mean Earth surface albedo is described: compute radiances of the Earth atmosphere system; compare computed with satellite measured radiance; and tune computed surface albedo accordingly. This requires a model of the Earth-atmosphere system which already models the anisotropy correctly and uses correct data on actual atmospheric state. Information on atmospheric turbidity and water vapor content can be taken from the operational meterological network. Other data can be taken from climatology. Land surfaces of 20 by 20 km are usually inhomogeneous. To establish a relatively accurate anisotropy model for such a mixed surface, identify the main components of the site; determine their relative amounts; assign an angular model to each component; and build mixed anisotropy model by weighted adding. Case studies show an accuracy within 0.01. ESA

N87-15583# Freie Univ., Berlin (West Germany). Inst. of Meteorology.
SATELLITE-DERIVED VEGETATION INDEX OVER EUROPE c43

Klaus Bluemel and W. Tonn *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 281-285 Original contains color illustrations (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

Data from NOAA-AVHRR were used for deriving vegetation indices. Indices depend on atmospheric influences, viewing geometry, surface topography, and vegetation density. Results for the most significant indices are presented. Bi-dimensional histograms of spectral channel are performed in different regions of Central Europe and North Africa for vegetation type analysis. ESA

N87-15584# Durham Univ. (England). Dept. of Geography.
VEGETATION INDEX MODELS FOR THE ASSESSMENT OF VEGETATION IN MARGINAL AREAS **c43**
R. Harris *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 287-291 Sponsored by Durham Univ.'s Middle East Center, England (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

Ground radiometer data and LANDSAT thematic mapper data for four terrain types in the Sidi Ali ben Aoun region of central Tunisia are analyzed. The effects of the band ratio and the normalized difference vegetation index on the near infrared/red feature space are shown. The results show the sensitivity of the vegetation indices to the data distribution. ESA

N87-15585# New Zealand Meteorological Service, Wellington.
CALIBRATION OF NORMALIZED VEGETATION INDEX AGAINST PASTURE GROWTH **c43**
B. F. Taylor, P. W. Dini, and J. W. Kidson *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 293-297 Original contains color illustrations (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

The normalized vegetation index (NVI) was calculated from direct-readout NOAA-7 data for a pastoral farming area of New Zealand. The correlation between monthly-mean NVI and monthly pasture growth, averaged over 7 measurement sites, is 0.8. Variations in NVI on time scales < 1 month agree qualitatively with estimates of regional daily rainfall and soil moisture. Results suggest that routine monitoring of pasture growth by meteorological satellites may be valuable to the agricultural industry. ESA

N87-15586# Bristol Univ. (England). Remote Sensing Unit.
AN OBJECTIVE MONITORING METHOD FOR AFRICAN RAINFALL BASED ON METEOSAT VIS AND IR IMAGES **c47**
E. C. Barrett and G. DSouza *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 305-313 Original contains color illustrations (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

The integration of three-time daily pairs of Meteosat visible and IR images, plus three night-time IR-only images, through an objective procedure for determining rain/no-rain boundaries across the whole continent of Africa is described. Suitable bispectral VIS/IR rain/no-rain thresholds were identified for the day-time imagery, and the boundaries thus determined were dilated to include allowances for early evening and night-time cloud growth and/or advection. Results are presented for every day in January 1985 and examples of daily rain-area maps, and 10-day and total monthly aggregated dry-area maps are also presented. ESA

N87-15587# Reading Univ. (England). Dept. of Meteorology.
RAINFALL ESTIMATION OVER THE SAHEL USING METEOSAT THERMAL INFRA-RED DATA **c47**
G. Dugdale and J. R. Milford *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 315-319 Sponsored by UK Overseas Development Agency and the European Economic Community (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

Objective methods for estimating rainfall from West African squall lines were devised. The nature of the phenomenon requires frequent IR imagery to be used. Large area mean rainfall or small area long period means may be estimated from the size and duration of storms in the area. Rainfall in limited areas (one to four pixels) from individual events requires an objective method for estimating the time varying vigor of the convective system. Rainfall estimations for periods of 30 and 10 days over the Republic of Niger show encouraging results in discriminating areas having significantly less or more than the mean for the zone. ESA

N87-15588# Mullard Space Science Lab., Dorking (England).
THE PROSPECTS FOR HYDROLOGICAL MEASUREMENTS USING ERS-1 **c43**
M. A. J. Guzkowska, I. M. Mason, C. G. Rapley, and F. A. Street-Perrott (Oxford Univ., England) *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 321-326 Sponsored by UK Science and Engineering Research Council (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

The prospects for using the Radar Altimeter (RA) and the Along Track Scanning Radiometer (ATSR) on ERS-1, for the joint measurement of lake levels and lake areas were assessed. SEASAT return waveforms over Great Salt Lake (USA) illustrate the use of the RA. It is estimated that with a repeat track of 35 days the RA could measure up to 200 closed lakes and 500 open lakes of over 100 sq km on a global scale. The ATSR has virtually complete global coverage. These measurements would be quality-controlled, accurate, self-consistent and have a high time resolution. ESA

N87-15589# Consiglio Nazionale delle Ricerche, Florence (Italy).
CONTRIBUTION OF PASSIVE MICROWAVE REMOTE SENSING IN SOIL MOISTURE AND EVAPOTRANSPIRATION MEASUREMENTS **c43**
P. Pampaloni, S. Paloscia, and L. Chiarantini (Segnalamento Marittimo ed Aereo S.p.A., Florence, Italy) *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 327-332 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

Microwave and infrared measurements (at 3 and 0.8 cm wavelengths) on bare and vegetated soils are reported. Results suggest that the 0.8 cm polarization index is related to leaf water potential. The absorption properties of corn and alfalfa, computed by means of the measured brightness temperature and a model based on the radiative transfer theory, are correlated to plant water content. ESA

N87-15590# Centre de Developpement des Techniques Avancees, Alger-Gare (Algeria).
THE FUNDAMENTAL PROBLEMS FOR THE ENERGY BALANCE STUDY BY SATELLITE IMAGERY
A. Abdellaoui *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 335-338 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

Models for studying the energy balance at the soil-atmosphere interface are reviewed. Problems to be solved for their application at a regional scale include expression of the dynamic resistances, combination of climatological measurements with satellite data, significance of the output parameters, and using the different scales for the input data. Solutions to problems concerning climatological parameters and the spatial extension of models are outlined. ESA

N87-15591# Institut National de la Recherche Agronomique, Avignon (France). Station de Bioclimatologie.
ESTIMATION OF REGIONAL EVAPORATION USING MIDDAY SURFACE TEMPERATURE FROM SATELLITE THERMAL IR DATA **c43**
B. Seguin, J. P. Lagouarde, and Y. Kerr (Centre National d'Etudes Spatiales, Toulouse, France) *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Confer-

ence May 1986 p 339-344 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

Computation of evaporation rate from satellite infrared data using the relation ETd - Rnd + A - B(Ts-Ta) where ETd is daily evaporation, Rnd is daily net radiation, Ts-Ta is the instantaneous midday difference between surface and air temperature, and A and B are adjustment constants, is discussed. Combination with ground operated meteorological models may offer an operational possibility to map ET at the spatial scale starting from the satellite pixel size. It was tested with Meteosat data, whose weakness is poor thermal IR calibration. The large pixel size (typically 5 km) could be more an advantage than a limitation, because it integrates more mixed surfaces thus allowing to adopt an overall mean value for B. However, NOAA-AVHRR appears to be best suited due to its better calibration but the access to the resolution of 1 km x 1 km could require adjusting B to each surface roughness. This could be done using the vegetation index. ESA

N87-15592# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Physik der Atmosphaere.
VEGETATION INDEX AND SURFACE TEMPERATURE IN A MESOSCALE CLIMATE MODEL c47
Hermann Mannstein *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 345-347 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

The influence of the slope, valley, and mountain-wind systems on the climate in and around the Alps is discussed. Variations in the surface sensible heat flux modify the intensity and the extent of these wind systems. A major influence on the surface energy budget arises from the reduced plant cover on steep south-facing slopes in higher regions. The amount of vegetation is estimated with the normalized vegetation index derived from NOAA-AVHRR data. If it is known, evapotranspiration and albedo spatial variability can be modelled. For the verification of the model surface energy budget, the surface temperatures can be used. Results of radiometric temperature measurements from an airplane are shown. ESA

N87-15593*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
OBSERVATIONS OF THE SEASONAL VARIABILITY OF SOIL MOISTURE AND VEGETATION COVER OVER AFRICA USING SATELLITE MICROWAVE RADIOMETRY
Eni G. Njoku and Indu R. Patel *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 349-353 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01 CSCL 04B

Multispectral passive microwave data from the scanning multichannel microwave radiometer (SMMR) on the Nimbus-7 satellite were processed selectively for a 1 yr period over Africa. The data show a wide dynamic range of brightness temperature (180 to 290 K), corresponding to variations in surface features such as moisture, temperature, vegetation, roughness, and large-scale topography. It appears that soil moisture variability is detectable with the SMMR over large regions of Africa. To what extent roughness and vegetation affect this capability is not clear. The lowest SMMR frequency is C-band (6.6 GHz), thus any soil moisture sensitivity at this frequency would be much improved by a sensor at L-band (1 to 2 GHz) less affected by roughness and vegetation. ESA

N87-15594*# Arizona Univ., Tucson. Optical Sciences Center.
VARIATIONS IN IN-FLIGHT ABSOLUTE RADIOMETRIC CALIBRATION
Philip N. Slater *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 357-363 Sponsored by NASA (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01 CSCL 08C

Variations in the in-flight absolute radiometric calibration of the Coastal Zone Color Scanner and the Thematic Mapper (TM) are reviewed. At short wavelengths, the sensors show a gradual reduction in response, while in the mid-IR the TM shows oscillatory variations. One set of measurements made at White Sands, New Mexico shows anomalous results in TM bands 2 and 4. The results of a reflectance-based and a radiance-based calibration method at White Sands are described. An analysis of the radiance-based method shows the value of such measurements from helicopter altitudes for calibration. ESA

N87-15595# Consiglio Nazionale delle Ricerche, Florence (Italy).
EVALUATION OF THE GEOSTATIONARY SATELLITE IMAGES GROUND RESOLUTION c43
P. Beni, V. Cappellini, R. Carla, and G. Maracchi *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 367-370 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

A method to compute ground resolution behavior in METEOSAT-2 images is described. The image ground resolution, which decreases from subsatellite point as a function of the satellite-observed point angular distance, is determined taking into account the Earth's flattening factor. Ground resolution quantitative data concerning a location-points, geographical grid, obtained using the procedure superimposed on a METEOSAT-2 image are reported. A nomogram obtained by assuming a spherical Earth, which allows rapid determination of the ground resolution, is reported. ESA

N87-15596# Rome Univ. (Italy). Dipt. di Fisica.
EFFECTS OF ATMOSPHERIC AEROSOL SIZE DISTRIBUTIONS ON THE RETRIEVAL OF SURFACE SPECTRAL RADIANCE FROM SATELLITE c43
C. Martellacci, G. Fiocco, and G. P. Gobbi (Consiglio Nazionale delle Ricerche, Frascati, Italy) *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 371-377 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

The effects introduced by molecules and aerosols on the retrieval of the surface spectral reflectance observed at the top of the atmosphere in the visible spectrum were evaluated using radiative transfer model. The model solves the multiple scattering problem using an adding procedure and Mie theory for a plane parallel atmosphere, and estimates changes introduced in the retrieval by variations of the atmospheric pressure and of the aerosol load, at moderate values of the atmospheric turbidity. Sensitivity to changes of the size distribution in an aerosol layer located near the ground, for three different aerosol types, is explored. ESA

N87-15597# Niamey Univ. (Niger). Faculty of Sciences.
GROUND BASED ATMOSPHERIC EXTINCTION MEASUREMENT IN THE SAHEL c43
Abdelkrim Ben Mohamed *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 379-380 Sponsored by International Satellite Land-Surface Climatology Project (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

Horizontal and vertical spectral extinction measurements and their relationships with surface and upper air meterological data are discussed. Because of the high dust content of Sahelian atmospheres from October to April, ground based atmospheric extinction measurements are necessary for validation of satellite data over this region. Results support the use of multiwavelength transmissometers in the Sahel. ESA

N87-15598# National Aeronautical Establishment, Ottawa (Ontario).
REGIONAL MEASUREMENTS OF EVAPOTRANSPIRATION

USING AIRCRAFT MOUNTED SENSORS c43
R. L. Desjardins, E. J. Brach, J. I. MacPherson, P. H. Schuepp (McGill Univ., Montreal, Quebec), and L. Austin (McGill Univ., Montreal, Quebec) *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 381-386 Sponsored by Energy Program of Agriculture Canada Prepared in cooperation with Agriculture Canada, Ottawa, Ontario (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

An instrumented aircraft studied the variability of evapotranspiration measurements over 20 and 500 sq km areas. The observations show variations in evapotranspiration estimates due to the variability of atmospheric phenomena, but repeatable mean values are obtained at 25 and 50 m by making 4 passes over a distance of 4 km. From day to day, less than 10% deviation is observed on 5 out of 6 days over the 20 sq km site. Over the 500 km area, less than 10% deviation in evapotranspiration is observed on 5 out of 6 sites for any 1 day. This analysis is not completed. ESA

N87-15599# Universite Catholique de Louvain (Belgium).
SONIC ANEMONETER SURFACE HEAT FLUX MEASUREMENTS FOR VALIDATION OF SATELLITE OBSERVATIONS c43
S. Cieslik, G. Schayes, and H. Hasenjeager (Joint Research Centre of the European Communities, Ispra, Italy) *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 387-392 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

Methods to deduce heat fluxes in the atmospheric surface layer from remotely sensed temperatures were developed. Since such determinations are subject to uncertainties, the relation between surface air temperatures and heat fluxes was investigated starting from surface-based heat flux recordings, combined with a sensitivity study. Results show that the heat fluxes derived are very sensitive to different surface characteristics and that surface-based measurements are indispensable. ESA

N87-15600# Tsolakidis (Costas), Piraeus (Greece).
LOCATION FINDING USING METEOROLOGICAL SATELLITE IMAGES c43
Costas Tsolakidis *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 393-398 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

A method of calculating the geographical coordinates of points on meteorological satellite images is proposed. This is achieved by superimposing corresponding maps on parts of linearized satellite images displayed on a monitor. The method combines elements of an orbit model and an affine transformation avoiding the requirements for fresh data and ground control points respectively. It was applied to TIROS/NOAA images. ESA

N87-15601# Observatoire du Pic-du-Midi, Bagneres de Bigorre (France).
EARTH ROTATION POLAR MOTION AND CLIMATOLOGY
J. P. Rozelot *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 399-400 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

It is shown that good climatic data, such as global atmospheric angular momentum measurements, along with highly accurate geodetic Earth rotation results permit the study of atmospheric circulation. The transfer of angular momentum between the atmosphere, solid Earth, and oceans is discussed. For example, results of Bonas (1965) indicate that short term variations in the length of the day are correlated with the E1 Nino phenomenon in 1982 and 1983. ESA

N87-15602# Florida State Univ., Tallahassee. Dept. of Meteorology.
AFRICAN DROUGHT: AN EXAMPLE OF THE INFLUENCE OF LAND-SURFACE PROPERTIES ON CLIMATE c47
S. E. Nicholsen *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 405-410 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

Spatial and temporal characteristics of rainfall variability in Africa are described. Based on these characteristics and a comparison of several African locations, it is suggested that the interaction between the land surface and atmosphere is an important factor in producing long and intense drought episodes in the Sahelian region. ESA

N87-15603# Lagos Univ. (Nigeria). Dept. of Geography.
THE SAHEL DROUGHTS: 1941-1984 c47
O. Ojo *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 411-415 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

The reliability of data used in African climate impact studies is discussed. It is argued that much empirically determined data are inadequate because of assumptions and generalizations. For example, most of the data available on the major components of the energy and water balances including solar and net radiations, longwave radiations from the surface and the atmosphere, evaporation, and runoff were determined empirically by using regression relations between these components and the commonly measured parameters such as relative humidity, temperature and precipitation. It is shown that such regression relations may be valid within reasonable errors only in the locations for which they are derived. A generalization for larger regions needs careful error analysis. ESA

N87-15604# Lund Univ. (Sweden). Remote Sensing Lab.
DESERTIFICATION MONITORING: REMOTELY SENSED DATA FOR DROUGHT IMPACT STUDIES IN THE SUDAN c45
Ulf Hellden *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 417-428 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

The relationship between a vegetation index based on LANDSAT and NOAA AVHRR GAC data and precipitation data in the Sudan was studied. Results indicate that the magnitude of the desertification problem in Kordofan is strongly exaggerated in many reports and described in an incorrect and misleading way. The impact of man on the environment, as to productivity of natural vegetation and crops, seems to be of a minor importance in the semi-arid Sudan compared to the climatic impact. Different perceptions of the course of desertification create a need for an objective instrument for land degradation monitoring. The results imply a high potential to develop an operational satellite based system for productivity and drought impact monitoring and possibly for crop yield and drought impact prediction. ESA

N87-15605# Calabar Univ. (Nigeria). Dept. of Geography and Regional Planning.
REGIONAL STUDIES WITH SATELLITE DATA IN AFRICA ON THE DESERTIFICATION OF THE SUDAN-SAHEL BELT IN NIGERIA c43
D. O. Adefolalu *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 429-438 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

Airborne side-looking radar and LANDSAT data were used to map vegetation in the Sudan-Sahelian region (SSR). Results show that because of its balance of payments deficit, the SSR continues to put too much pressure on the land, encouraging desertification. Nigeria was classified as a member of the SSR after appraisal of the events sequel to the 1969 to 73 drought showed evidence of desertification in the West African sub-region. Desertification is now threatening areas north of latitude 10 N in the country. ESA

N87-15606# Khartoum Univ. (Sudan). Dept. of Geography.
TOWARD A DROUGHT-ORIENTED CLIMATIC PREDICTION

SYSTEM IN WESTERN SUDAN c47
Mahdi Amin ElTom *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 439-442 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

The need for better climate monitoring in western Sudan is discussed. The establishment of a drought-oriented climatic prediction system to give an early warning of the possible occurrence of a below-normal rainy season is proposed. For this system to succeed, there is a need to identify the climatic indicators of drought and to establish a network for observing and monitoring these indicators. ESA

N87-15607# Kenya Meteorological Dept., Nairobi.
USE OF REMOTE SENSING APPLICATION FOR AGRICULTURAL EXPANSION INTO SEMI-ARID AREAS OF KENYA c43
Silvery B. B. Otengi *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 443-448 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

Principles underlying agricultural planning for semiarid areas are reviewed. During the Kenyan long rains period, that is March, April and May rains, satellite pictures were used to monitor trends of moisture from highland areas where rainfall is abundant to semiarid areas of the country. Results support agricultural expansion into the semiarid areas of the country. ESA

N87-15608# Paris-Sud Univ., Orsay (France). Dept. de Bioclimatology.
IMPORTANCE OF THE TROPICAL RAIN FOREST AS AN ATMOSPHERIC MOISTURE SOURCE c47
B. A. Monteny *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 449-454 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

Land surface processes at the forest-atmosphere interface were studied. Tropical forest evapotranspirations were calculated, knowing the solar energy and rain distributions, soil water storage and the plant characteristics. Atmospheric water vapor originating from these forests is found to be 60 % to 75 % of the total rainfall. The recycling of water evaporated from the tropical forest is very important: water vapor is driven northward by southwesterlies inside the continent where it is then reprecipitated. Deforestation, on a large scale, induces modifications in the global land surface processes: more sensible heat is transferred to the atmosphere due to the evolution of the physical and biological characteristics of the soil-plant interface. ESA

N87-15609# Reading Univ. (England). Dept. of Meterology.
HYDROLOGICAL STUDIES IN NIGER c43
I. D. Flitcroft, G. Dugdale, and J. R. Milford *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 455-459 Sponsored by UK Overseas Development Agency and the European Economic Community (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

A data set for the development and validation of algorithms relating Meteosat data to components of the water budget in the Niger was collected. Field measurements show that evaporation from bare soils in these regions is mainly controlled by the depth of the upper layer of dry soil. A useful approximation to the daily evaporation rate can be obtained from a simple relationship between the evaporation and the time since the previous rainfall. Rainfall estimation from satellites must be calibrated against rain gage measurements. The rapid decrease in correlation between rainfalls with increasing grid separation is significant for the interpretation of rain gage and satellite rainfall measurements. Spatial variability in IR radiances must be taken into account where comparing observed surface temperatures with those deduced from Meteosat. ESA

N87-15610# Innsbruck Univ. (Austria). Inst. of Meteorology and Geophysics.
VEGETATION IDENTIFICATION AND VARIABILITY IN THE TAHOUA AREA, NIGERIA c43
H.-J. Bolle *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 461-466 Original contains color illustrations (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

Seven LANDSAT images were analyzed for vegetation cover and strength. The data were homogenized using unchanging test areas for calibration before a normalized vegetation index (NVI) algorithm was applied. Vegetation changes are quantified in terms of the area covered by vegetation of specific NVI and 600/700 mm reflectance. The MSS-5 signal was used in addition to the NVI to discriminate sparse vegetation from soil with increasing reflectance in the near infrared. The vegetation pattern provides information about soil moisture distributions. In dry years or seasons, vegetation concentrates in areas which carry open water during rainy seasons. The high resolution information clearly supplements global vegetation index maps. ESA

N87-15611# Instituut voor Culturtechniek en Waterhuishouding, Wageningen (Netherlands).
GROUND WATER-FED LAKES IN THE LIBYAN DESERT: THEIR VARYING AREA AS OBSERVED BY MEANS OF LANDSAT-MSS DATA c43
H. Kuipers and M. Meneti *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 467-471 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

Five LANDSAT-MSS images acquired between November 1975 and September 1978 were used to study the temporal variability of the area of 3 small groundwater-fed lakes in the Idehan Awbari, Libya. The hydrological role of the lakes is described. Mean reflectance of a small image window enclosing each lake is taken as a measure of the lake area. To obtain the mean surface reflectance applying to the spectral region 0.4 to 1.1 microns, radiometric and geometric corrections are applied. Results show that oscillations of the lake area occur which would not be predicted on the basis of current hydrological wisdom applying to this region. ESA

N87-15612# Ghent Univ. (Belgium). Lab. for Regional Geography.
ASSESSMENT OF WIND AND FLUVIAL ACTION BY USING LANDSAT-MSS COLOR COMPOSITES IN THE LOWER NILE VALLEY (EGYPT) c43
A. Gad and L. Daels *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 473-476 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

Black and white LANDSAT images were used to study wind and water erosion in the Nile Valley (Egypt). Wind action, especially upon the Western Desert, causes the erosion of the limestone plateau and is responsible for the accumulation of eolian deposits along the western boundaries of the Mile Valley. Fluvial action, by occasional thunderstorms, causes the erosion of the Eastern Desert plateau and hills and causes the accumulation of debris in the eastern side of the Nile valley. The Diazochrome-film sandwich technique was used to get false color composites with an optimal contrast. The interference zone between the eolian deposits of the Western Desert and fluvial deposits of the Nile Valley is well recognized. ESA

N87-15613# Universidad Nacional de Mexico, Mexico City. Inst. de Geofisica.
SYSTEMS APPROACH TO QUANTIFY DESERTIFICATIONS PROCESSES USING LANDSAT-MSS DATA c43
Juan Carlos delaTorre *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 477-481 (For primary document see N87-15544 07-46)

Avail: NTIS HC A99/MF A01

The shortcomings in the relationship between the LANDSAT multispectral scanner and a target ecosystem are analyzed. The capabilities of methods to study desertification from space are discussed. It is concluded that a systems approach can be useful to design a system for measuring the desertification process from space. ESA

N87-15614# Kasetsart Univ., Bangkok (Thailand). Faculty of Forestry.

THE APPLICATION OF LANDSAT IMAGERY FOR LAND COVER ASSESSMENT c43

S. Wacharakitti *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 483-486 (For primary document see N87-15544 07-46)

Avail: NTIS HC A99/MF A01

Satellite imagery was used to study deforestation in Thailand. The forest land cover of the northeastern region in 1973 was 50,671 sq km (30%), decreased to 31,221 sq km (18.49%) in 1978, and to 25,886 sq km (15.33%) in 1982. The average forest land depletion in the period 1973 to 1978 is 8.4% annually, while the most critical locations are at Phen and Chi watersheds, at 10.85% and 10.21% per annum respectively. In the period 1978/1982, the average forest land depletion is 6.95% annually; the most critical locations are at Chi and Phen, at 8.58% and 8.18% per annum respectively. It is proved that LANDSAT imagery in term of black and white, and false color composite prints of 1: 250,000 scale can provide enough information on forest land cover and other land uses. ESA

N87-15615# Lund Univ. (Sweden). Lab. of Remote Sensing.

SURFACE ALBEDO CHANGE IN ARID REGIONS IN THE SUDAN c43

L.-O. Zell *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 487-491 (For primary document see N87-15544 07-46)

Avail: NTIS HC A99/MF A01

Albedo change for 8 regions in arid to semiarid zones in central Sudan was calculated using LANDSAT 1 and 3 images registered in Oct./Nov. 1972 and Oct. 1979. Areas with low cultivation intensities show a decrease in surface albedo indicating a better green biomass cover at the end of the rainy season in 1979 than in 1972. Increases in albedo occur in areas with high cultivation intensities. ESA

N87-15616# Copenhagen Univ. (Denmark). Inst. of Geography.

VARIATION IN SURFACE ALBEDO AND ENERGY-BALANCE IN AN ARCTIC/SUBARCTIC ENVIRONMENT

Henrik Soegaard *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 493-496 (For primary document see N87-15544 07-46)

Avail: NTIS HC A99/MF A01

A satellite-data based program describing the variation in surface albedo and energy balance was initiated in Greenland. The program consists of a study of retrospective data and of field experiments conducted in the marginal Arctic/subarctic zone in the southwestern part of the island. Most of the satellite study is based on data from NOAA-AVHRR. It is shown that there is a fixed lower limit for the decrease in surface albedo for a fully snowcovered area. Basic methods in deriving surface parameters from satellite data are tested against field observation, and an energy balance for an Arctic area is evaluated. ESA

N87-15617# Sherbrooke Univ. (Quebec). Centre d'Applications et de Recherche en Teledetection.

PRELIMINARY RESULTS OF ANTHROPOGENIC ALBEDO CHANGES OVER THE PAST 15 YEARS IN EASTERN CANADA c45

Alain Royer, Lise Charbonneau, and Ferdinand Bonn *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 497-499 (For primary document see N87-15544 07-46)

(Grants NSERC-A-8643; NSERC-A-5252; FCAR-EQ-102)

Avail: NTIS HC A99/MF A01

Results of the parameterization of land-surface characteristics over eastern Canada are presented. On the scale of the whole of Quebec, the analysis of statistical data from governmental agencies reveals, during the last decade, a deforestation phenomenon, a significant decrease of farmland (-35%) and a marked process of urbanization (+60%). The estimated induced albedo decrease is on the order of 1% to 5%. On a regional scale, urbanization of the Montreal city area gives a decrease of albedo of 2%. The albedo is computed from the ground reflectance corrected for atmospheric effects. ESA

N87-15618# Zurich Univ. (Switzerland). Dept. of Geography.

MONITORING OF LAND-SURFACE CHANGE IN SRI LANKA c43

H. Haefner and S. D. F. C. Nanayakkara (Survey Dept., Colombo, Sri Lanka) *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 501-507 (For primary document see N87-15544 07-46)

Avail: NTIS HC A99/MF A01

A method to continuously monitor land transformation processes and land-cover changes by satellite technology in Sri Lanka was developed. Land-use maps 1:100,000 (benchmark maps) and masking techniques form the basis for qualifying and quantifying the seasonal variations and long-term modifications results show worrying rates of deforestation and tea plantation disappearance. Paddy land remains constant. Data on other land use categories is insufficient. The Center for Remote Sensing at the Survey Department is executing the mapping and monitoring procedure and serves as focal point for introducing techniques and transferring results to the users, e.g., government agencies engaged in planning, resources management, and development. ESA

N87-15619# University of the West Indies, Kingston (Jamaica).

VEGETATION CHANGE AND DESERTIFICATION IN THE CARIBBEAN c45

L. Alan Eyre *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 509-514 (For primary document see N87-15544 07-46)

Avail: NTIS HC A99/MF A01

Evidence that surface climatology is changing in many parts of the Caribbean region is discussed. The trend is from humid tropical and dry seasonal forest towards increasing aridity, with savanization and actual desertification being apparent. There is a debate as to the degree to which the changes are anthropogenic and due to misuse of the environment. All evidence points to overexploitation of essentially fragile island ecosystems. Field studies and sampling of time-sequential satellite imagery, including LANDSAT, suggest that a combination of remotely sensed and ground verified data is useful in documenting trends in land surface climatology. ESA

N87-15620# Indian Space Research Organization, Ahmedabad. Space Applications Centre.

VARIATION OF SKIN TEMPERATURE IN DESERT REGIONS IN THE NEIGHBOURHOOD OF INDIA IN RELATION TO ASIAN MONSOON CIRCULATION c47

T. A. Hariharan, P. C. Joshi, and P. S. Desai *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 515-522 (For primary document see N87-15544 07-46)

Avail: NTIS HC A99/MF A01

Boundary layer thermal changes over the heat low region in the north west of India are examined in relation to the south west monsoon circulation. A permanent thick inversion is seen to exist during the season for the year 1979. A similar analysis for the year 1982 using NOAA satellite sounding data was also made. Skin temperature variations and their relationship with the lowest atmospheric layer temperature in relation to south west monsoon are discussed. ESA

N87-15621# Consiglio Nazionale delle Ricerche, Florence (Italy).

AN INTEGRATED SYSTEM TO ASSESS AGRICULTURAL PRO-

DUCTIVITY c43
C. Conese, G. Maracchi, F. Miglietta, V. Cappelini, R. Carla, and V. Sacco *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 523-530 Original contains color illustrations (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

An approach to an integrated system for the assessment of agricultural productivity is presented. It uses LANDSAT data to extract information on a field scale, connected with farm activity, while meteorological satellites give information on the thermal behavior of the ground, on a global scale. By correlating the satellite data with ground information such as digital cartography, land soil biological parameters, and meteorological data acquisition by a conventional network, an intermediate or simplified crop model was developed to integrate conventional ground data with satellite data, to assess agricultural productivity. ESA

N87-15622# Indian Space Research Organization, Ahmedabad. Space Applications Centre.
AVHRR AND MSS DATA BASED VEGETATION INDICES STUDIES OVER INDIAN SITES c43
R. K. Gupta (National Remote Sensing Agency, Hyderabad, India), B. K. Ranganath (National Remote Sensing Agency, Hyderabad, India), S. T. Chari (National Remote Sensing Agency, Hyderabad, India), and R. P. S. Chhonkar *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 531-535 Original contains color illustrations (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

Images from NOAA AVHRR normalized vegetation index (NVI) over Shivalik forest range (India) and adjoining regions for the months of May and November were analyzed with the help of LANDSAT/MSS data based interpretation maps to bring out the differential biomass signatures of different forest types, and canopy cover, and their variations after the rainfall season. The results of Allapalli forest region AVHRR NVI image analysis are presented. The results of comparative analysis of ratio and normalized vegetation indices, principal components images over a Palmaner taluk subscene are discussed. First level result of improved vegetation discrimination with the use of NVI, and bands 7 and 5 as components of false-color composite are presented. ESA

N87-15623# Thessaloniki Univ. (Greece). Dept. of Biology.
THE USE OF REMOTE SENSING TECHNIQUES IN THE STUDY OF VEGETATION RECOVERY AFTER FIRE IN MEDITERRANEAN COUNTRIES (A PRELIMINARY STUDY) c43
J. Diamantopoulos and S. Paraskevopoulos *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 537-538 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

The possible contribution of the International Satellite Land Surface Climatology Project (ISLSCP) to studying the impact of fire on the biomass of Greece is discussed. The ISCLSCP could help in long term monitoring activities and the constitution of archives for retrospective studies. It could also complete climatological data, especially in mountainous areas, and develop indexes and algorithms to follow the regeneration process. ESA

N87-15624# Marmara Research Inst., Gebze (Turkey).
REMOTE SENSING ACTIVITES IN TURKEY: POSSIBLE CONTRIBUTIONS TO CLIMATE STUDIES c43
F. Ince *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 539-540 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

Remote sensing institutions and activities in Turkey are listed. Climate related data collection needs are stressed, especially at the Euphrates Basin where several thousand square kilometers of land will be either inundated or turned into irrigated areas in 10 to 20 yr. ESA

N87-15625# Centre National de la Recherche Scientifique, Strasbourg (France). Groupement Scientifique de Teledetection Spatiale.
DESIGN OF A DATA BASE SYSTEM FOR INFERRING LAND SURFACE PARAMETERS AND FLUXES FROM SATELLITE RADIANCES c43
L. Asfar (IBM France S. A., Paris), A. Asem (IBM France S. A., Paris), F. Becker, P. Y. Deschamps (Centre National d'Etudes Spatiales, Toulouse, France), P. DeFraipont, D. Ho (IBM France S. A., Paris), J. L. Mercier, E. Olory-Hechinger, P. Olory (IBM France S. A., Paris), M. Raffy et al *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 541-548 Sponsored by CNRS, CNES, and IBM (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

A data base system which handles as automatically as possible the satellite images and necessary input data used to study time and space variations of climate processes was designed. The general scheme to infer latent and sensible heat fluxes, ground fluxes, and thermal inertia includes calibration, atmospheric corrections, navigation (geometric corrections) and the models which lead to the requested land surface parameters and fluxes from relocated and renormalized radiances. ESA

N87-15626# Environmental Analysis and Remote Sensing, Delft (Netherlands).
GROUP AGROMET MONITORING PROJECT (GAMP) METHODOLOGY INTEGRATED MAPPING OF RAINFALL, EVAPOTRANSPIRATION, GERMINATION, BIOMASS DEVELOPMENT AND THERMAL INERTIA, BASED ON METEOSAT AND CONVENTIONAL METEOROLOGICAL DATA c43
A. Rosema *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 549-557 Original contains color illustrations (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

Satellite and conventional meteorological data were integrated to achieve space and time continuous mapping and monitoring of rainfall, evapotranspiration, germination dynamics, and biomass development. Rainfall, evapotranspiration, and biomass mapping results demonstrate the feasibility of the methodology to extend existing sources of agro and hydrometeorological information. The accuracy of rainfall mapping, based on METEOSAT cloud information, is 30%. The accuracy of evapotranspiration mapping, based on METEOSAT ground information, is 0.5 mm (10%). Germination and biomass mapping are based on the latter data. End of season biomass results compare well with field observations. The mapping and analysis of thermal inertia demonstrates the potential of evaluating soil water infiltration immediately after rainfall. ESA

N87-15627# Centre National de Recherches Meteorologiques, Toulouse (France). Etablissement d'Etudes et de Recherche Meteorologiques.
HYDROLOGICAL ATMOSPHERIC PILOT EXPERIMENT (HAPEX) 86 c43
J. P. Goutorbe *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 559-561 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

In order to define ground-atmosphere interactions needed to improve knowledge of climate and the general circulation of the atmosphere, the Hydrological Atmospheric Pilot Experiment was designed to document these interactions on a scale compatible with the mesh of general circulation models. It consists of measuring, at pertinent scales in time and space, the evaporation flux in conjunction with the radiative, meteorological, and hydrological parameters which may be applied to calculate the evaporation flux. It is thus possible to test existing parameterizations of the evaporation flux as well as to develop new ones. ESA

N87-15628# Instituut voor Culturtechniek en Waterhuishouding, Wageningen (Netherlands).
FUTURE EUROPEAN PLANS IN THE FRAMEWORK OF THE

INTERNATIONAL SATELLITE LAND SURFACE CLIMATOLOGY PROJECT (ISLSCP) c43

M. Menenti and F. Becker (Centre National de la Recherche Scientifique, Strasbourg, France) *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 563-566 (For primary document see N87-15544 07-46)

Avail: NTIS HC A99/MF A01

Steps which led to a stable organizational framework of European participation in the International Satellite Land Surface Climatology Project are summarized. The objectives of the joint European experimental program are described, along with the criteria applied to the planning of the field experiments. It is emphasized that field experiments are necessary under different climatic conditions. A main shortcoming of algorithms to extract surface properties from satellite data is their dependence on climate, because of the simplifying assumptions involved. An inventory of field experiments and geographic areas; scientific goals; relevance for applications; and coordination and integration are outlined. ESA

N87-15629*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

THE FIRST INTERNATIONAL SATELLITE LAND SURFACE CLIMATOLOGY PROJECT (ISLSCP) FIELD EXPERIMENT - FIFE

T. J. Schmugge and P. J. Sellers *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 567-571 (For primary document see N87-15544 07-46)

Avail: NTIS HC A99/MF A01 CSCL 08B

The International Satellite Land Surface Climatology Project (ISLSCP) will verify the use of satellite data for the estimation of land-surface properties through field experiments using point measurements on the ground and areal measurements from aircraft overflights. It will study approaches for obtaining areal averages of the radiation, moisture, and heat fluxes made using remotely sensed data, by combining the surface point measurements of the fluxes with the aircraft areal observations using a surface energy balance model. Surface parameters to be estimated from aircraft observations include: surface radiation temperature, albedo, land cover or vegetation index, and surface soil moisture. The latter will be obtained using passive and active microwave approaches. The area-averages of the surface properties will be compared with satellite data. The First ISLSCP Field Experiment is planned for a site having relatively uniform vegetation cover in the central great plains of the U.S.A. ESA

N87-15630# Ludwig-Maximilians-Universitaet, Munich (West Germany). Inst. fuer Meteorologie.

SATELLITE MEASUREMENTS OF RADIATION BUDGET OF THE EARTH (3RD SYMPOSIUM) Final Report, Oct. 1984

Heinrich Quenzel and Erhard Raschke (Cologne Univ. (West Germany).) Bonn, West Germany BMFT Jul. 1986 179 p Symposium held in Munich, West Germany, 25-26 Oct. 1984 Sponsored by BMFT

(BMFT-FB-W-86-011; ISSN-0170-1339; ETN-87-98764) Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

The determination of the radiation budget parameters at the top and the bottom of the atmosphere; temporal variations of clouds and their impact on the radiation budget; global radiation at ground and surface albedo derived from satellite measured radiances; and technical aspects of the conical scan radiometer were discussed. For individual titles, see N87-15631 through N87-15654.

N87-15631# Cologne Univ. (West Germany).

RADIATION AND CLOUDS: A SUMMARY OF INTERNATIONAL AND NATIONAL ACTIVITIES c47

E. Raschke *In* Ludwig-Maximilians-Universitaet Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 13-17 (For primary document see N87-15630 07-46)

Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

International and West German research concerning the generation of cloud fields in circulation or climate field, possibly with all their effects on the radiation, precipitation, and transfer of heats of condensation/evaporation, and calculations of the transfer of solar shortwave and terrestrial longwave radiation in the presence of such fields is outlined. Parameterization of radiation and clouds in circulation models is discussed. ESA

N87-15632# INAP, Paris (France).

HYDROLOGICAL ATMOSPHERIC PILOT EXPERIMENT (HAPEX) HYDROLOGY BUDGET MODELING (MOBILHY): OUTLINE OF THE PROGRAM c43

Andree Tuzet *In* Ludwig-Maximilians-Universitaet Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 19-23 (For primary document see N87-15630 07-46)

Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

An experiment to improve understanding of land surface processes at scales from 100m to 100km; test parameterization schemes used in general circulation models; and aid to the interpretation of remote sensing data is outlined. The strategy is based on an instrumented network with a grid size of the order of 10 x 10 km on a total domain of the order of 100 x 100 km. The network includes surface, subsurface, and atmospheric measurements. The network data are completed by airborne data to extrapolate to larger scales the local measurements, and to get calibrating data for the satellite remote sensing measurements. The experiments are followed by a numerical simulation of the mesoscale atmospheric flow above the domain. ESA

N87-15633# Max-Planck-Inst. fuer Meteorologie, Hamburg (West Germany).

A CLOUD CLIMATOLOGY FOR THE SOUTH ATLANTIC DERIVED FROM METEOSAT DATA c47

S. Bakan, S. Coulmann, and H. Hinzpeter *In* Ludwig-Maximilians-Universitaet Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 25-30 (For primary document see N87-15630 07-46)

Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

Monthly maps of the average and standard deviation of total and high level cloud cover at 1200 GMT were drawn as isolines of values derived for 5 deg x 5 deg regions from Meteosat data for the South Atlantic. The main features are the boundary layer cloudiness with closed cells in the eastern region, the high cloud coverage in connection with the subtropical jet stream, and the relatively low cloud coverage in the western regions. From the autocorrelation function of the cloud coverage typical time scales for the cloudiness were derived. Highest values are found in the regions of the boundary layer cloudiness. The data were used to compile frequency distributions of cloud coverage. ESA

N87-15634# Centre National de la Recherche Scientifique, Verrieres-Le Buisson (France). Service d'Aeronomie.

EFFECTS OF REGIONAL-SCALE DIURNAL VARIATIONS ON THE RADIATION BALANCE OF THE EARTH-ATMOSPHERE SYSTEM

J. P. Duvel and R. Kandel *In* Ludwig-Maximilians-Universitaet Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 31-37 Sponsored by CNES, and the Delegation Generale a la Recherche Scientifique et Technique (For primary document see N87-15630 07-46)

Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

The IR histogram evolution technique was applied to Meteosat data. Regional-scale diurnal variations significantly affecting the radiation balance are revealed, even when only short data sequences are available. With better information on diurnal variations, it is possible to eliminate the corresponding bias from Earth radiation budget results. This is important because a number

of climate change mechanisms depend critically on relatively small changes in the radiation balance. ESA

N87-15635# GKSS-Forschungszentrum Geesthacht (West Germany).
INFLUENCE OF MULTIPLE CLOUD LAYERS ON PLANETARY ALBEDO
K. Bumke (Kiel Univ., West Germany) and H. Grassl *In* Ludwig-Maximilians-Universitaet Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 39-44 (For primary document see N87-15630 07-46)
Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

The influence of clouds on the planetary albedo is investigated by a one-dimensional radiation transfer model using the Delta-Eddington approximation. Results show a slightly smaller planetary albedo for a combination of an optical thin high cloud with an optical thick cloud below when compared to the planetary albedo of an atmosphere with only the lower cloud. The reason is additional absorption by the large sized ice particles of the high cloud, as documented by spectral investigations. Calculations with different degrees of overlap show that the influence of overlap cannot be neglected, if planetary albedo is calculated for a given cloud amount. ESA

N87-15636# Hamburg Univ. (West Germany).
RADIATION BUDGET VARIATIONS CAUSED BY THIN CIRRUS
Stefan Kinne, Andreas Manschke (Kiel Univ., West Germany), and Hartmut Grassl (Gesellschaft fuer Kernenergieverwertung in Schiffbau und Schiffahrt m.b.H., Hamburg, West Germany) *In* Ludwig-Maximilians-Universitaet Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 45-49 (For primary document see N87-15630 07-46)
Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

The radiation budget variations of the atmosphere caused by thin cirrus are examined with a one dimensional model of radiative transfer. The optical parameters are approximated with the Mie-theory by comparison with exact Monte Carlo calculations. The main result is a warming of the atmosphere with a cirrostratus of 1 km thickness compared to a cloudless atmosphere; a loss of energy only arises at low positions of the Sun in cold atmospheres (midlatitude winter, Arctic atmosphere). ESA

N87-15637# Cologne Univ. (West Germany). Inst. fuer Geophysik und Meteorologie.
GLOBAL AND ATMOSPHERIC RADIATION AT GROUND FROM SATELLITE DATA
A. Gratzki, B. Z. Shen, M. Rieland, and P. Schmetz *In* Ludwig-Maximilians-Universitaet Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 51-57 (For primary document see N87-15630 07-46)
Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

A method to estimate global radiation and downward atmospheric radiation at ground from satellite data is presented. Global radiation is estimated using a radiative transfer model. Downward atmospheric radiation is obtained by a regression between the temperature near the ground and the downward flux, with cloud emission added. ESA

N87-15638# Universite des Sciences et Techniques de Lille (France). Lab. d'Optique Atmospherique.
SHORT WAVE RADIATIVE FLUXES AT SURFACE FROM NOAA SATELLITES
B. Bonnel, J. C. Buriez, and Y. Fouquart *In* Ludwig-Maximilians-Universitaet Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 59-63 (For primary document see N87-15630 07-46)
Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

Factors important in the derivation of the surface SW budget, the degree of sophistication necessary in the inversion procedure, and the ultimate degree of accuracy obtainable in the best practical conditions were studied. Analysis of satellite data reveals standard error in surface fluxes of 70 W/sqm for a simple regression model. This deviation is large compared to requirements of climate studies (10 W/sqm) but is comparable to results obtained by other methods. ESA

N87-15639# Stuttgart Univ. (West Germany). Inst. fuer Physikalische Elektronik.
ESTIMATION OF GLOBAL, DIRECT AND DIFFUSE RADIATION FROM SATELLITE IMAGES BY STATISTICAL METHODS
P. Schwarzmann, R. Doerrer, B. Straub, and E. R. Reinhardt (Siemens A.G., Erlangen, West Germany) *In* Ludwig-Maximilians-Universitaet Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 65-68 (For primary document see N87-15630 07-46)
(Contract ESF-016-80(D))
Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

A ground radiation estimation approach excluding physical atmosphere models and introducing merely satellite image features gained by image processing procedures was developed. Radiation data is evaluated by a statistical model. Results for global, direct, and diffuse radiation from NOAA-6 and -7 images are presented. ESA

N87-15640# Cologne Univ. (West Germany). Inst. fuer Geophysik und Meteorologie.
TEMPORAL, SPECTRAL, AND SPATIAL SAMPLINGS: PROBLEM IN RADIATION BUDGET MEASUREMENTS
R. Stuhlmann and H. Knottenberg *In* Ludwig-Maximilians-Universitaet Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 69-79 (For primary document see N87-15630 07-46)
Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

A model to simulate satellite measurements and to calculate the averaged exitances is presented. The model was used for a comparison of bidirectional reflectance functions calculated from different sources, and a demonstration of the errors introduced by the narrow to broadband conversion. The bidirectional reflectance functions calculated theoretically and experimentally compare well, but more results about the anisotropic reflectance characteristic of natural scenes are needed. Uncertainty in the bidirectional reflectance function can be compensated by a more complex scan geometry, e.g., conical scan. For the narrow to broadband conversion it is shown that a first order correction, including the dependency on the underlying scene, results in an error of 3 to 5 W/sqm in the areal average of the estimated exitances. This result is due to the narrow and triangular sensor response. With a more broadband and flatter sensor response, the error is reduced. ESA

N87-15641# Cologne Univ. (West Germany). Inst. fuer Geophysik und Meteorologie.
AN APPROACH TO DERIVE THE RADIATION BUDGET OVER THE SAHARA
Matthias Wiegner *In* Ludwig-Maximilians-Universitaet Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 81-95 (For primary document see N87-15630 07-46)
Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

A method which inverts radiance measurements received from Earth orbiting instruments to spatial and temporal averages of the radiation budget at the top of the atmosphere was developed. It includes corrections for angular and spectral sampling and considers the overlapping of measurements. Data originate from a sunsynchronous (NIMBUS 7) and from a geostationary satellite (Meteosat 1). The first gives calibrated data, the latter serves as spatial and temporal interpolation and for scene identification. It is attempted to calibrate Meteosat data by radiation fluxes derived by the ERB scanner (NIMBUS 7) to provide the interpolation. Results concerning the radiation budget over Northern

Africa are shown and improvements to the method are suggested. ESA

N87-15642# Cologne Univ. (West Germany). Inst. fuer Geophysik und Meteorologie.
DERIVATION OF SURFACE PROPERTIES FROM SATELLITE OBSERVATIONS
G. Nacke and E. Ruprecht *In* Ludwig-Maximilians-Universitaet Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 97-105 (For primary document see N87-15630 07-46)
Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

A cluster analysis of two-dimensional histograms (visible and infrared satellite observations) is applied to derive surface properties as albedo and temperature. Derivation of planetary albedo and brightness temperature for a clear sky scene is described. It is shown for ocean and land scenes, how well the clear sky scene clusters (ground clusters) can be determined in the two-dimensional histograms and which additional information is needed. The classification of ground clusters is based on time series of the characteristic radiances, assuming that: ground albedo is constant over a few days; over the ocean the ground albedo shows a characteristic diurnal variation; the diurnal course of the ground temperature is known; and ground temperature is constant during a period of a few days (for a fixed time of day). Results for a region of the west coast of South America and the adjacent ocean derived from the GOES-East observations as part of the pilot data set of the International Satellite Cloud Climatology Project are shown. ESA

N87-15643# Universite de Technologie de Compiegne (France).
ERRORS AND UNCERTAINTIES IN SATELLITE DERIVED ALBEDO
F. Kermel and C. Delorme *In* Ludwig-Maximilians-Universitaet Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 107-109 (For primary document see N87-15630 07-46)
Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

Errors and uncertainties in albedo derived from Meteosat VIS channel are discussed. It is shown that in bidirectional reflection studies, an important variation of the albedo with solar zenith angle cannot be significant. ESA

N87-15644# Ludwig-Maximilians-Universitaet, Munich (West Germany). Inst. fuer Meteorologie.
UNCERTAINTY OF SATELLITE DERIVED CLEAR SKY SHORT-WAVE RADIATION BUDGET
P. Koepke, K. T. Kriebel (Deutsche Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen, West Germany), and B. Dietrich *In its* Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 111-116 (For primary document see N87-15630 07-46)
Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

The conversion factors for broadband nadir radiances (gt) are determined, using the conversion factors to convert radiances into radiant exitances just above the Earth surface (gs). The variability of gs is shown to be 0.1 or higher, suggesting uncertainty for gt in the range 0.1 to 0.13, depending on solar position and atmospheric turbidity. The uncertainty corresponds to an error in the surface albedo of 0.025. To get the 0.01 accuracy required by the International Satellite Land Surface Climatology Project, the mean g-values cannot be used, surface anisotropy must be better modeled. ESA

N87-15645# Universite de Technologie de Compiegne (France).
ESTIMATION OF ATMOSPHERIC TURBIDITY
F. Kermel and C. Delorme *In* Ludwig-Maximilians-Universitaet Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 118-122 (For primary document see N87-15630 07-46)
Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

A method to estimate atmospheric turbidity was developed to help estimate solar energy potential in West Africa. It is shown that, with a reference image and with the knowledge of water vapor pressure, a derived parameter allows a good estimation of the turbidity factor from the VIS-channel of Meteosat. ESA

N87-15646# Johann-Wolfgang-Goethe-Univ., Frankfurt am Main (West Germany). Inst. fuer Meteorologie und Geophysik.
EFFECT OF MEASURED AEROSOL ABSORPTION ON THE RADIATION BUDGET
Gottfried Haenel *In* Ludwig-Maximilians-Universitaet Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 123-126 Sponsored by Deutsche Forschungsgemeinschaft (For primary document see N87-15630 07-46)
Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

An experimental method to get in situ the heating rate of the atmosphere due to absorption of shortwave radiation in particles was developed. Measurements were conducted at the ground, yielding a total heating during the daylight period between 0.04 and 2.7 K at Frankfurt and Tucson/Arizona, respectively. During cloud free conditions the measurements can be used to estimate the energy flux density of shortwave radiation absorbed by particles within the whole atmosphere. ESA

N87-15647# Kernforschungszentrum, Karlsruhe (West Germany). Lab. fuer Aerosolphysik und Filtertechnik 1.
THE CORRELATION BETWEEN THE PHYSICO-CHEMICAL AND OPTICAL PROPERTIES OF TROPOSPHERIC AEROSOLS WITH REGARD TO THE RADIATION BUDGET (POETA) PROGRAM
G. Metzig *In* Ludwig-Maximilians-Universitaet Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 127-131 Sponsored by Bundesministerium fuer Forschung und Technologie (For primary document see N87-15630 07-46)
Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

A program to determine the optical properties (200 to 700 nm continuously) of tropospheric aerosols and their relation to the chemical composition and physical microstructure (internal-external mixtures, shapes) of the particles is outlined. All properties are determined as a function of particle size, relative humidity, pH-value, and wavelength. All data will be made available to mesoscale climate models. The measuring program and results of single fly ash particle measurements, including the physical and chemical analysis, are presented. ESA

N87-15648# Ludwig-Maximilians-Universitaet, Munich (West Germany). Inst. fuer Meteorologie.
DETERMINATION OF THE LONGWAVE SURFACE NET FLUX FROM RADIANCES TO SPACE
Ralf Meerkoetter and Hartmut Grassl (GKSS-Forschungszentrum Geesthacht, West Germany) *In its* Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 133-136 (For primary document see N87-15630 07-46)
Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

An algorithm for long wave net flux at the ocean surface in clear atmospheres from spectral radiances at satellite height is presented. An advantage of the method is the surface net flux determination without estimating components separately. The best radiometer channels are found by examination of the peculiarities of radiative transfer. Only spectral intervals located within the window limits (8 to 13 microns) suit the development of an algorithm. A 2 channel approach turns out to be successful, if 10 w/sqm accuracy is to be reached. ESA

N87-15649# Ludwig-Maximilians-Universitaet, Munich (West Germany). Lehrstuhl fuer Bioklimatologie und Angewandte Meteorologie.
PROBLEMS IN THE APPLICATION OF THERMAL IMAGES IN URBAN CLIMATOLOGY

G. Schwarzmaier *In its* Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 137-142 (For primary document see N87-15630 07-46)
Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

Multispectral airborne measurements were carried out over three densely populated areas to receive thermal images, which show a temperature field of the black body radiation of the underlying surface for a certain area and a defined period of time. The flights took place on clear days in all seasons, at noon, in the evening after sunset, and the following morning before sunrise. Flying height ranged between 2500 and 2600 m above ground level. Results show that large scale thermal images can be applied for an overview of the thermal situation, but for the interpretation of images with high resolution it is not reasonable to neglect the occurence of errors. ESA

N87-15650# Ludwig-Maximilians-Universitaet, Munich (West Germany). Inst. fuer Meteorologie.
MEASUREMENTS AND ESTIMATIONS OF THE ENERGY BALANCE AND SURFACE TEMPERATURE OF THE DISCHMA VALLEY (SWITZERLAND)
Matthias Brehm, Barbara Hennemuth, Ulf Koehler, and Katrin Nodop *In its* Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 143-148 Sponsored by Deutsche Forshungsgemeinschaft (For primary document see N87-15630 07-46)
Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

The effects on a valley atmosphere of the elevated heat sources at the valley floor and the valley side walls were investigated. To determine the convergence of the sensible heat flux within the valley atmosphere, and to relate the warming of the valley atmosphere to the valley and slope winds, it is necessary to determine the surface energy balance. The components of the energy balance and the surface temperature for the entire valley area were calculated on the basis of three energy balance stations and of specific surface temperature measurements. ESA

N87-15651# Kiel Univ. (West Germany). Institut fuer Meereskunde.
CLOUD DETECTION AND CLASSIFICATION OVER OCEANS AT NIGHT WITH NOAA-7 **c47**
S. Olesen and Hartmut Grassl *In* Ludwig-Maximilians-Universitaet Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 149-154 (For primary document see N87-15630 07-46)
(Grant DFG-GR-660/5-1)
Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

A cloud detection method based only on infrared signals, and where pixels are processed individually, so retaining the full resolution of the radiometer, is outlined. The different extinction of clouds in the longwave spectral domain allows the detection and classification of clouds at night if the surface temperature and/or the temperature profile are approximately known. The classification into low, middle, and high clouds works assuming the standard atmosphere for the corresponding latitude and season. A significant improvement is expected by the continuous adaptation of algorithm thresholds to the actual profile either by surface temperature values in clear pixels or by temperature profiles from TIROS Operational Vertical Sounder onboard NOAA-7. ESA

N87-15652# GKSS-Forschungszentrum Geesthacht (West Germany). Inst. fuer Physik.
MULTIANGLE OR MULTIWAVELENGTH TECHNIQUE FOR REMOTE SENSING OF SEA SURFACE TEMPERATURE **c43**
Walter Meyer (Kiel Univ., West Germany) and Hartmut Grassl *In* Ludwig-Maximilians-Universitaet Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 155-162 (For primary document see N87-15630 07-46)
Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

The multiangle and multiwavelength techniques for sea surface temperature (SST) estimation were compared, using channels 4 and 5 of the Advanced Very High Resolution Radiometer/2 (AVHRR/2) on NOAA-7 centered at 10.8 and 12.0 microns, respectively, for the split window and the multiple angle approach. The influence of horizontal inhomogeneity, modeled by thin, almost invisible cirrus clouds, on the multiangle method was also examined. Results show no improvement in determining SST from measurements at two angles or by combining a two wavelength and a two angle technique at present radiometer noise levels. The influence of almost invisible, thin cirrus clouds on the conical scan is drastic. Normally distributed cirrus clouds (optical thickness between 0 and 0.02) add 0.8 K to the mean total error, reaching 1.31 K for polluted skies. Only direct comparison between the measurements of the Along Track Scanning Radiometer and the AVHRR/2 can decide which technique is best. ESA

N87-15653# Clermont-Ferrand Univ. (France).
ESTIMATE OF BROADBAND CONVERSION FACTORS FOR THE METEOSAT VIS CHANNEL **c43**
J. Stum and B. Pinty *In* Ludwig-Maximilians-Universitaet Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 163-171 (For primary document see N87-15630 07-46)
Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

A simplified spectral model is used to simulate the radiance emerging at the top of the atmosphere, in order to examine the sensitivity of the conversion factor to the main parameters involved. A parameterization of this factor is derived and applied to Meteosat data for West Africa. ESA

N87-15654# Cologne Univ. (West Germany). Inst. fuer Geophysik und Meteorologie.
THE MODULATION TRANSFER OF THE AIRBORNE VERSION OF THE CONICAL SCAN RADIOMETER (AVCSR) **c43**
Bernd Bauch and Detlef Hennings *In* Ludwig-Maximilians-Universitaet Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 175-179 (For primary document see N87-15630 07-46)
Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

An eight channel narrow field of view scanning radiometer for airborne operation at flying altitudes up to at least 10 km is presented. Angular sampling is achieved by conical scanning at different nadir angles, for a good angular coverage. Interchangeable detector assemblies are provided with spectral channels adapted for different measuring objects (anisotropy, fluxes, clouds, surface, aerosols, satellite calibration). A chopper applies a 50% amplitude modulation (assuming 50% chopping ratio and chopping sinoidally) which doubles the frequency bands of the field of view to both sides of the chop frequency. The resulting transfer function represents the signal amplitude transformation from the optical input to the detector. The low frequency band and the chop frequency band contain the same signal information, except at zero frequency (average signal) which cannot be detected by pyroelectric detectors directly. ESA

N87-15655*# Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
CRUSTAL DEFORMATION IN GREAT CALIFORNIA EARTHQUAKE CYCLES
Victor C. Li and James R. Rice (Harvard Univ., Cambridge, Mass.) Oct. 1986 78 p
(Grant NAG5-740)
(NASA-CR-180059; NAS 1.26:180059) Avail: NTIS HC A05/MF A01 CSCL 08G

Periodic crustal deformation associated with repeated strike slip earthquakes is computed for the following model: A depth L (less than or similiar to H) extending downward from the Earth's surface at a transform boundary between uniform elastic lithospheric plates of thickness H is locked between earthquakes. It slips an amount consistent with remote plate velocity V sub pl after each lapse of earthquake cycle time T sub cy. Lower portions

of the fault zone at the boundary slip continuously so as to maintain constant resistive shear stress. The plates are coupled at their base to a Maxwellian viscoelastic asthenosphere through which steady deep seated mantle motions, compatible with plate velocity, are transmitted to the surface plates. The coupling is described approximately through a generalized Elsasser model. It is argued that the model gives a more realistic physical description of tectonic loading, including the time dependence of deep slip and crustal stress build up throughout the earthquake cycle, than do simpler kinematic models in which loading is represented as imposed uniform dislocation slip on the fault below the locked zone. Author

N87-15656*# Utah State Univ., Logan. Center for Atmospheric and Space Science.
INVESTIGATION INTO ALTERNATIVE STATISTICAL AURORAL OVAL MODELS, STAGE 1
M. Bowline, J. J. Sojka, and D. S. Evans (National Oceanic and Atmospheric Administration, Boulder, Colo.) Jan. 1987 8 p
(Grant NAG5-748)
(NASA-CR-180061; NAS 1.26:180061; CASS-87-01) Avail: NTIS HC A02/MF A01 CSCL 04A

The statistical model sensitivity to different methods of binning the NOAA/TIROS data base was examined. Each partial auroral pass was analyzed to locate the latitude of peak electron energy flux. Then using this location as the final reference latitude, all other data was binned relative to it. The next line of attack was to bin according to where the latitudinal profile center of gravity lay. This procedure overcomes the problem of very narrow intense features controlling the binning. Again the same data sets were analyzed and a binning made. These profiles look better and indeed look similar to the original auroral model. The passes were then binned relative to the equatorward boundary. The problems associated with the equatorward edge were resolved. B.G.

N87-15657*# Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
STRAIN ACCUMULATION AND SURFACE DEFORMATION ALONG THE SAN ANDREAS, CALIFORNIA Technical Report, 1 Mar. - 31 Dec. 1986
Victor C. Li 31 Dec. 1986 20 p
(Grant NAG5-740)
(NASA-CR-180058; NAS 1.26:180058) Avail: NTIS HC A02/MF A01 CSCL 08G

Stressing and rupture of a locked zone adjacent to a creeping fault segment was studied with special reference to strength heterogeneity depthwise and along-strike. The resulting precursory temporal and spatial variations of surface strain rate profiles were compared to geodetic measurements on the San Andreas fault in central California. Crustal deformation in great California earthquake cycles was also studied with special reference to the temporal decay of strain rate observed since the 1957 and 1906 great earthquakes, and comtemporary surface strain rate and velocity profiles at several locations along the San Andreas. The effect of viscoelastic response in the deep aseismic shear zone on the surface deformation behavior was examined. Work was begun on a fundamental reformulation of the crustal deformation problem focusing on the crustal deformation process affected by deep aseismic slip as the slip zone progresses toward an instability and as deep seismic slip continues postseismically, the 3-D nature of the problem due to geometry and material heterogeneity, and the time-dependent source coming from the lithosphere/ astenospheric coupling process. B.G.

N87-15658# Rutherford High Energy Lab., Chilton (England).
AURORAL ELECTRON ACCELERATION BY LOWER-HYBRID WAVES
R. Bingham, D. A. Bryant, and D. S. Hall Jan. 1986 39 p
(DE86-703346; RAL-86-008) Avail: NTIS HC A02/MF A01

Because the particles and electric fields associated with inverted-V electron streams do not have the characteristics expected for acceleration by a quasistatic potential difference, the possibility that the electrons are stochastically accelerated by waves is investigated. It is demonstrated that the lower hybrid waves seen on auroral field lines have the right properties to account for the electron acceleration. It is further shown that the lower hybrid wave power measured on auroral field lines can be generated by the streaming ions observed at the boundary of the plasma sheet, and that this wave power is sufficient to account for the electron power observed close to the atmosphere. Author

N87-15659*# Tennessee Univ. Space Inst., Tullahoma.
NONLINEAR WAVE VACILLATION IN THE ATMOSPHERE Annual Status Report, 1 Jan. - 31 Dec. 1986
Basil N. Antar 22 Jan. 1987 11 p
(Grant NAGw-863)
(NASA-CR-179985; NAS 1.26:179985) Avail: NTIS HC A02/MF A01 CSCL 04A

The problem of vacillation in a baroclinically unstable flow field is studied through the time evolution of a single nonlinearly unstable wave. To this end a computer code is being developed to solve numerically for the time evolution of the amplitude of such a wave. The final working code will be the end product resulting from the development of a heirarchy of codes with increasing complexity. The first code in this series was completed and is undergoing several diagnostic analyses to verify its validity. The development of this code is detailed. B.G.

N87-15660*# Texas Univ., Austin. Center for Space Research.
UNDERSEA VOLCANO PRODUCTION VERSUS LITHOSPHERIC STRENGTH FROM SATELLITE ALTIMETRY Semiannual Research Progress/Status Report, 1 Jun. - 31 Nov. 1986
B. D. Tapley and D. T. Sandwell 20 Jan. 1986 8 p
(Grant NAG5-787)
(NASA-CR-179984; NAS 1.26:179984) Avail: NTIS HC A02/MF A01 CSCL 08K

All seamount signatures apparent in the SEASAT altimeter profiles were located and digitized. In addition to locating the seamount signatures, their amplitudes were also estimated. The second phase consisted of determining what basic characteristics of a seamount can be extracted from a single vertical deflection profile. Seven seamounts that had both good bathymetric coverage and good satellite altimeter coverage were used to test a simple flexural model. A method was developed to combine satellite altimeter profiles from several different satellites to construct a detailed and accurate geoid. B.G.

N87-15661*# Cornell Univ., Ithaca, N.Y.
MOUNTAIN BUILDING PROCESSES IN THE CENTRAL ANDES Semiannual Progress Report, 1 Feb. - 31 Jul. 1986
A. L. Bloom and B. L. Isacks [1986] 7 p
(Contract NAS5-28767)
(NASA-CR-180069; NAS 1.26:180069; SAPR-2) Avail: NTIS HC A02/MF A01 CSCL 08K

False color composite images of the Thematic Mapper (TM) bands 5, 4, and 2 were examined to make visual interpretations of geological features. The use of the roam mode of image display with the International Imaging Systems (IIS) System 600 image processing package running on the IIS Model 75 was very useful. Several areas in which good comparisons with ground data existed, were examined in detail. Parallel to the visual approach, image processing methods are being developed which allow the complete use of the seven TM bands. The data was organized into easily accessible files and a visual cataloging of the quads (quarter TM scenes) with preliminary registration with the best available charts for the region. The catalog has proved to be a valuable tool for the rapid scanning of quads for a specific investigation. Integration of the data into a complete approach to the problems of uplift, deformation, and magnetism in relation to the Nazca-South American plate interaction is at an initial stage. B.G.

N87-15662*# National Aeronautics and Space Administration, Washington, D.C.
CRATERING MECHANICS
B. A. Ivanov Aug. 1986 99 p Transl. into ENGLISH from Itogi Nauki i Tekhniki, Seriya Mekhanika Deformiruyemogo Tverdogo

Tela (Moscow, USSR), v. 14, 1981 p 60-128 Transl. by SCITRAN, Inc., Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88477; NAS 1.15:88477) Avail: NTIS HC A05/MF A01 CSCL 08G

Main concepts and theoretical models which are used for studying the mechanics of cratering are discussed. Numerical two-dimensional calculations are made of explosions near a surface and high-speed impact. Models are given for the motion of a medium during cratering. Data from laboratory modeling are given. The effect of gravitational force and scales of cratering phenomena is analyzed. Author

N87-15663*# Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
MECHANICS OF SHEAR RUPTURE APPLIED TO EARTHQUAKE ZONES
Victor C. Li May 1986 156 p Submitted for publication
(Grant NAG5-740)
(NASA-CR-180070; NAS 1.26:180070) Avail: NTIS HC A08/MF A01 CSCL 08K

The mechanics of shear slippage and rupture in rock masses are reviewed. The essential ideas in fracture mechanics are summarized emphasizing the interpretation and relation among the fracture parameters in shear cracks. The slip-weakening model is described. The general formulation of the problem of nonuniform slip distribution in a continuum is covered. B.G.

N87-15664 Rice Univ., Houston, Tex.
A RADIATIVE TRANSFER STUDY OF THE EARLY TERRESTRIAL ATMOSPHERES Ph.D. Thesis
Richard Durham 1986 76 p
Avail: Univ. Microfilms Order No. DA8617439

Earth, Mars, and Venus formed at about the same time and in the same region of the solar nebula. It is therefore reasonable to assume that their initial composition and tectonic activity were similar. A primary goal was to estimate the partial pressure of CO2 in the early atmospheres. Dissert. Abstr.

N87-15665*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LAGEOS ORBIT DECAY DUE TO INFRARED RADIATION FROM EARTH
David Parry Rubincam Jan. 1987 21 p
(NASA-TM-87804; Rept-86B0542; NAS 1.15:87804) Avail: NTIS HC A02/MF A01 CSCL 04A

Infrared radiation from the Earth may be the principal reason for the decay of Lageos' orbit. The radiation heats up the laser retroreflectors embedded in Lageos' aluminum surface. This creates a north-south temperature gradient on the satellite. The gradient in turn causes a force to be exerted on Lageos because of recoil from photons leaving its surface. The delayed heating of the retroreflectors due to their thermal inertia gives the force a net along-track component which always acts like drag. A simple thermal model for the retroreflectors indicates that this thermal drag accounts for about half the observed average along-track acceleration of -3.3 x 10 to the -10 power m/sec squared. The contribution from the aluminum surface to this effect is negligible. The infrared effect cannot explain the large observed fluctuations in drag which occur mainly when the orbit intersects the Earth's shadow. Author

N87-15666# Boston Coll., Chestnut Hill, Mass.
THERMOSPHERE STRUCTURE VARIATIONS DURING HIGH SOLAR AND MAGNETIC ACTIVITY CONDITIONS Final Report, 8 Mar. 1982 - 30 Sep. 1985
Jeffrey M. Forbes 30 Sep. 1985 76 p
(Contract F19628-82-K-0031)
(AD-A171350; AFGL-TR-86-0009) Avail: NTIS HC A05/MF A01 CSCL 04/1

Analyses of satellite accelerometer and rocket grenade and pitot tube data are performed to delineate the seasonal latitudinal variability of temperature and density between 80 and 120 km, and the latitude time dependence of temperature, density, and wind variability at satellite attitudes during geomagnetically disturbed conditions. A two cell pattern of neutral winds is inferred from the satellite data that intensifies and expands spatially in response to increased magnetic activity. Density variations during magnetically active conditions are characterized by density bulges and troughs, some of which remain quasi-stationary at high latitudes, and others which suggest wave propagation towards the equator. Monthly tabulations every 15 deg latitude of temperature, density, and pressure up to 120 km are provided which merge smoothly with the Air Force Reference Atmosphere in the 70-80 km height regime. Theoretical calculations are utilized to provide estimates of tidal variability about the mean values contained in the tables. GRA

N87-15667# Physical Sciences, Inc., Andover, Mass.
COCHISE ATMOSPHERIC NITROGEN/OXYGEN EXCITATION STUDIES Final Report, 23 Mar. 1982 - 22 Mar. 1985
W. T. Rawlins, L. G. Piper, A. Gelb, G. E. Caledonia, and P. E. Nebolsine Dec. 1985 578 p
(Contract F19628-82-C-0050)
(AD-A172234; PSI-050/TR-509; AFGL-TR-85-0322) Avail: NTIS HC A25/MF A01 CSCL 04/1

The Final Report describes related COCHISE and FAKIR studies of: (1) excited nitrogen reactions which can influence atmospheric molecular emission in the short to middle wave length infrared; and (2) the phenomenology of ozone vibrational fluorescence in the long-wavelength infrared. COCHISE observations of the excitation of NO, CO, N2O, and electronic states of N2 by energy transfer in discharge excited nitrogen are presented, and related FAKIR measurements of the kinetic behavior of metastable N and N2 are given. Other related FAKIR studies of the products of discharged N2O are discussed. GRA

N87-15668# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
MEASURING AND MODELING SOLAR IRRADIANCE ON VERTICAL SURFACES
E. L. Maxwell, T. L. Stoffel, and R. E. Bird Jul. 1986 36 p
(Contract DE-AC02-83CH-10093)
(DE86-010737; SERI/TR-215-2525) Avail: NTIS HC A03/MF A01

Presented are the first evaluations of 5 algorithms for converting global horizontal and direct normal solar irradiance components to global irradiance on tilted surfaces using measurements from the Solar Radiation Research Laboratory (SRRL) at SERI. High resolution (15-min) measurements from 8 thermopile radiometers oriented vertically in the 4 cardinal directions were available for a 169-day period ending 31 December 1984. Concurrent measurements of global horizontal and direct normal solar irradiance components were also used. The pyranometers used were intercompared on horizontal, north-facing, and south-facing vertical orientations. The conversion algorithms each attempt to account for the very complex atmospheric interactions with incoming solar radiation. The sky and ground radiance contributions to tilted surface are assumed to be isotropic, anisotropic, or a combination of the two depending on the algorithm. Results from the analysis of measurements on vertical surfaces for 22 July through 4 September indicate a general overestimate (18% to 46.5%) of solar irradiance on north-facing surfaces by all 5 of the algorithms. The best agreement with measured data was demonstrated for south-facing surfaces where all but one algorithm were within the present measurement by as much as 23% of the observed 15-min data. DOE

N87-15816# Abastumani Astrophysical Observatory, Georgia (USSR).
INVESTIGATION ON THE INTENSITY PROGRESSION OF F-REGION NIGHTGLOW EMISSION OF THE OXYGEN RED LINE BY MEANS OF ATMOSPHERIC GRAVITY WAVES SOLITON
G. G. Didebulidze, L. M. Fishkova, and D. Pataraya *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 147-150

(For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15823# Academy of Sciences, Potsdam (East Germany). Central Inst. of Astrophysics.
STOCHASTIZATION OF CHARGED PARTICLE MOTION NEAR A MAGNETIC FIELD REVERSAL AND THE PROBLEM OF EXPLOSIVE RECONNECTION
J. Buechner and L. M. Zeleny *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 195-201 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15825# Indian Inst. of Geomagnetism, Bombay.
SPONTANEOUS RECONNECTION IN THE EARTH'S MAGNETOTAIL
G. S. Lakhina and K. Schindler (Ruhr Univ., Bochum (West Germany).) *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 209-213 Sponsored by Alexander von Humboldt Stiftung and the Deutschen Forschungsgemeinschaft (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N87-15669*# Pennsylvania State Univ., University Park. Dept. of Meteorology.
UTILIZATION OF SATELLITE DATA IN MESOSCALE MODELING OF SEVERE WEATHER Final Report
Thomas T. Warner 20 Jan. 1987 5 p
(Grant NsG-5205)
(NASA-CR-179917; NAS 1.26:179917) Avail: NTIS HC A02/MF A01 CSCL 04B

The Visible Infrared Spin Scan Radiometer Atmospheric Sounder (VAS) data were used to model the 36 hour cyclogenesis period over the Pacific Ocean. Various combinations of VAS data, conventional radiosonde data, and gridded data from the National Weather Service global analysis were used in successive-correction and variational objective-analysis procedures. The Penn State/NCAR mesoscale model was used to test the impact of the VAS data on a 12 hour forecast of convective precipitation in the midweastern U.S. B.G.

N87-15670*# Pennsylvania State Univ., University Park. Dept. of Meteorology.
VERIFICATION OF MESOSCALE OBJECTIVE ANALYSES OF VAS AND RAWINSONDE DATA USING THE MARCH 1982 AVE/VAS SPECIAL NETWORK DATA
James D. Doyle and Thomas T. Warner Jan. 1987 62 p
(Grant NsG-5205)
(NASA-CR-179988; NAS 1.26:179988) Avail: NTIS HC A04/MF A01 CSCL 04B

Various combinations of VAS (Visible and Infrared Spin Scan Radiometer Atmospheric Sounder) data, conventional rawinsonde data, and gridded data from the National Weather Service's (NWS) global analysis, were used in successive-correction and variational objective-analysis procedures. Analyses are produced for 0000 GMT 7 March 1982, when the VAS sounding distribution was not greatly limited by the existence of cloud cover. The successive-correction (SC) procedure was used with VAS data alone, rawinsonde data alone, and both VAS and rawinsonde data. Variational techniques were applied in three ways. Each of these techniques was discussed. B.G.

N87-15671*# Pennsylvania State Univ., University Park. Dept. of Meteorology.
UTILIZATION OF VAS SATELLITE DATA IN THE INITIALIZATION OF AN OCEANIC-CYCLOGENESIS SIMULATION
Sharon G. Douglas and Thomas T. Warner Sep. 1986 32 p
(Grant NsG-5205)
Avail: NTIS HC A03/MF A01 CSCL 04B

A series of experiments was performed to test various method of incorporating Visible Infrared Spin Scan Radiometer Atmospheric Sounder (VAS)-sounding data into the initial conditions of the Penn State University/National Center for Atmospheric mesoscale model. The VAS data for this ocean-cyclogenesis case consist of 110 irregularly distributed temperature and humidity soundings located over the North Pacific Ocean and apply at approximately 1200 GMT 10 November 1981. Various methods of utilizing VAS data in the initial condition of a mesoscale model were evaluated. B.G.

N87-15672# Air Force Geophysics Lab., Hanscom AFB, Mass.
THE EFFECT OF VIEWING ASPECT ON CLIMATOLOGICAL CLOUD DISTRIBUTION
Donald D. Grantham and Albert R. Boehm 23 Jul. 1986 10 p Presented at the 3rd International Conference on Statistical Climatology Abstracts, Vienna, Austria, 23-27 Jun. 1986
(AD-A170440; AFGL-TR-86-0149) Avail: NTIS HC A02/MF A01 CSCL 04/2

The manner in which a cloud scene is observed and meteorologically reported produces varying results due to the observing system or procedures employed. As a satellite passes over a scene, the amount of reported cloud cover will be less at its zenith angle than at its limb scan angle. Ground observers estimate the sky cover of this scene relative to an imaginary sky dome. Neither system gives an accurate estimate of Earth cover, an important parameter needed to determine albedo for Earth radiation balance and climate studies. New models have been developed to specify the cloud distributions that depend on the way the clouds have been observed or on the way the distributions are to be used. The Burger distribution has been found to fit well traditional sky cover, e.g., coverage of the hemispherical sky dome as viewed by a ground observer. This distribution is the result of a large number of realizations of a sawtooth weather generator which approximates a Gaussian field with a particular correlation function. The parameters of the distribution - mean sky cover and scale distance (a spatial correlation parameter) have easily recognized climatic meaning. An atlas of these parameters, giving seasonal and diurnal worldwide coverage for cloud distributions, has been prepared. When clouds are viewed at a specific angle, i.e., from a satellite, the probability of coverage will vary. Building on previous cloud-free line-of-sight modeling we have further specified this angular dependency. GRA

N87-15673# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
NOWCASTING THERMODYNAMIC PROFILES USING A TRIANGLE OF WIND PROFILERS IN AN ADVECTION MODEL M.S. Thesis
Randall A. Skov 1986 123 p
(AD-A171288; AFIT/CI/NR-86-121T) Avail: NTIS HC A06/MF A01 CSCL 04/2

An experiment has been devised which tests the utility of three 50 MHz wind profiler's data as a complement to the twice daily rawinsonde observation network. The goal was to determine if, by use of the profiler data in an advection model, one can predict the thermodynamic sounding during the twelve hour period between standard rawinsonde observations. Using the thermodynamic, moisture and continuity equations, local tendencies are obtained at each gridpoint. Each hour, the velocity fields are reanalyzed using the new profiler winds. Thermodynamic and wind soundings extracted from the gridded data are verified against the supplemental soundings. Results indicate that despite being limited by the availability of profiler winds, the simple advection model design and the effects of deep convection, the model produced soundings are an improvement over both persistance and initial soundings modified with surface data. Many enhance-

ments are identified which can upgrade the quality and quantity of the profiler data as well as the advection model results. GRA

N87-15674# Naval Research Lab., Washington, D. C.
TETHERED BALLOON MEASUREMENTS AT SAN NICOLAS ISLAND (OCTOBER 1984): INSTRUMENTATION, DATA SUMMARY, PRELIMINARY DATA INTERPRETATION Interim Report, 18-29 Oct. 1984
Hermann Gerber 16 Jul. 1986 80 p
(AD-A172226; NRL-8972) Avail: NTIS HC A05/MF A01 CSCL 04/2

A 12-day field experiment was held on San Nicolas Island (SNI) in October 1984 to test the operation of a tethered balloon system and to get an indication of the vertical profiles of some of the meteorological parameters. The instrumentation consisting of the balloon system, nephelometer, and psychrometer are described in detail. The collected data are presented in tables and plots. Preliminary interpretation of the data is given; this includes the vertical dependence of the aerosol scattering coefficient, wind jets found at the inversion, and entrainment into stratocumulus clouds. Conclusions are given on the performance of the tethered balloon, the suitability of SNI for future vertical structure experiments, and the value of balloon measurements in such experiments.
Author (GRA)

N87-15675# National Oceanic and Atmospheric Administration, Silver Spring, Md. Air Resources Lab.
WATER VAPOR PROFILES FOR WASHINGTON, D.C.; BOULDER, COLORADO; PALESTINE, TEXAS; LARAMIE, WYOMING AND FAIRBANKS, ALASKA DURING THE PERIOD 1974 TO 1985: DATA REPORT
S. J. Oltmans Jul. 1986 436 p
(PB86-234622; NOAA-DR-ERL-ARL-7) Avail: NTIS HC A19/MF A01 CSCL 04B

Profiles from the stratosphere obtained from ballonborne, chilled-mirror, frost-point hygrometers are presented for Washington, D.C.; Boulder, Colorado; Palastine, Texas; Laramie, Wyoming; and Fairbanks, Alaska. The data are presented in tabulated and graphical form. GRA

N87-15566# Meteorological Office, Bracknell (England).
INDICATIONS OF THE SENSITIVITY OF EUROPEAN CLIMATE TO LAND USE VARIATIONS USING A ONE-DIMENSIONAL MODEL
David A. Warrilow *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 159-166 (For primary document see N87-15544 07-46)
(Contract CEC-CL.113.UK(H))
Avail: NTIS HC A99/MF A01

N87-15567# Academia Sinica, Beijing (China). Inst. of Atmospheric Physics.
CLIMATIC EFFECT OF SNOWFALL ANOMALLY IN MID-HIGH LATITUDES IN A ONE-DIMENSIONAL AIR-LAND MODEL
Jin-Jun Ji *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 167-170 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15574# Freie Univ., Berlin (West Germany). Inst. fuer Meteorologie.
SURFACE TEMPERATURE FROM AVHRR AND TOVS FROM THE METEOROLOGICAL SATELLITE NOAA 9
H. Billing *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 225-234 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15586# Bristol Univ. (England). Remote Sensing Unit.
AN OBJECTIVE MONITORING METHOD FOR AFRICAN RAINFALL BASED ON METEOSAT VIS AND IR IMAGES
E. C. Barrett and G. DSouza *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 305-313 Original contains color illustrations (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15587# Reading Univ. (England). Dept. of Meteorology.
RAINFALL ESTIMATION OVER THE SAHEL USING METEOSAT THERMAL INFRA-RED DATA
G. Dugdale and J. R. Milford *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 315-319 Sponsored by UK Overseas Development Agency and the European Economic Community (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15592# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Physik der Atmosphaere.
VEGETATION INDEX AND SURFACE TEMPERATURE IN A MESOSCALE CLIMATE MODEL
Hermann Mannstein *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 345-347 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15602# Florida State Univ., Tallahassee. Dept. of Meteorology.
AFRICAN DROUGHT: AN EXAMPLE OF THE INFLUENCE OF LAND-SURFACE PROPERTIES ON CLIMATE
S. E. Nicholsen *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 405-410 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15603# Lagos Univ. (Nigeria). Dept. of Geography.
THE SAHEL DROUGHTS: 1941-1984
O. Ojo *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 411-415 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15606# Khartoum Univ. (Sudan). Dept. of Geography.
TOWARD A DROUGHT-ORIENTED CLIMATIC PREDICTION SYSTEM IN WESTERN SUDAN
Mahdi Amin ElTom *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 439-442 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15608# Paris-Sud Univ., Orsay (France). Dept. de Bioclimatology.
IMPORTANCE OF THE TROPICAL RAIN FOREST AS AN ATMOSPHERIC MOISTURE SOURCE
B. A. Monteny *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 449-454 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15620# Indian Space Research Organization, Ahmedabad. Space Applications Centre.
VARIATION OF SKIN TEMPERATURE IN DESERT REGIONS IN THE NEIGHBOURHOOD OF INDIA IN RELATION TO ASIAN MONSOON CIRCULATION
T. A. Hariharan, P. C. Joshi, and P. S. Desai *In* ESA Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference May 1986 p 515-522 (For primary document see N87-15544 07-46)
Avail: NTIS HC A99/MF A01

N87-15631# Cologne Univ. (West Germany).
RADIATION AND CLOUDS: A SUMMARY OF INTERNATIONAL AND NATIONAL ACTIVITIES
E. Raschke *In* Ludwig-Maximilians-Universitaet Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 13-17 (For primary document see N87-15630 07-46)

Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

N87-15633# Max-Planck-Inst. fuer Meteorologie, Hamburg (West Germany).
A CLOUD CLIMATOLOGY FOR THE SOUTH ATLANTIC DERIVED FROM METEOSAT DATA
S. Bakan, S. Coulmann, and H. Hinzpeter *In* Ludwig-Maximilians-Universitaet Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 25-30 (For primary document see N87-15630 07-46)
Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

N87-15651# Kiel Univ. (West Germany). Institut fuer Meereskunde.
CLOUD DETECTION AND CLASSIFICATION OVER OCEANS AT NIGHT WITH NOAA-7
S. Olesen and Hartmut Grassl *In* Ludwig-Maximilians-Universitaet Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) Jul. 1986 p 149-154 (For primary document see N87-15630 07-46)
(Grant DFG-GR-660/5-1)
Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 37

48 OCEANOGRAPHY

Includes biological, dynamic, and physical oceanography; and marine resources.

For related information see also *43 Earth Resources and Remote Sensing.*

N87-15676*# State Univ. of New York, Binghamton. Dept. of Geological Sciences.
EFFECTS OF THE OCEANS ON POLAR MOTION: EXTENDED INVESTIGATIONS Semiannual Status Report, Jul. - Dec. 1985
Steven R. Dickman 23 Jan. 1987 3 p
(Grant NAG5-145)
(NASA-CR-179986; NAS 1.26:179986) Avail: NTIS HC A02/MF A01 CSCL 08C

Matrix formulation of the tide equations (pole tide in nonglobal oceans); matrix formulation of the associated boundary conditions (constraints on the tide velocity at coastlines); and FORTRAN encoding of the tide equations excluding boundary conditions were completed. The need for supercomputer facilities was evident. Large versions of the programs were successfully run on the CYBER, submitting the jobs from SUNY through the BITNET network. The code was also restructured to include boundary constraints. B.G.

N87-15677*# State Univ. of New York, Binghamton. Dept. of Geological Sciences.
EFFECTS OF THE OCEANS ON POLAR MOTION: EXTENDED INVESTIGATIONS Semiannual Status Report, Jan. - Aug. 1986
Steven R. Dickman Aug. 1986 9 p
(Grant NAG5-145)
(NASA-CR-180066; NAS 1.26:180066) Avail: NTIS HC A02/MF A01 CSCL 08C

A method was found for expressing the tide current velocities in terms of the tide height (with all variables expanded in spherical harmonics). All time equations were then combined into a single, nondifferential matrix equation involving only the unknown tide height. The pole tide was constrained so that no tidewater flows across continental boundaries. The constraint was derived for the case of turbulent oceans; with the tide velocities expressed in terms of the tide height. The two matrix equations were combined. Simple matrix inversion then yielded the constrained solution. Programs to construct and invert the matrix equations were written. Preliminary results were obtained and are discussed. B.G.

51 LIFE SCIENCES (GENERAL)

N87-15678*# National Aeronautics and Space Administration, Washington, D.C.
REFERENCE MISSION OPERATIONAL ANALYSIS DOCUMENT (RMOAD) FOR THE LIFE SCIENCES RESEARCH FACILITIES
Jan. 1987 215 p
(NASA-TM-89604; NAS 1.15:89604) Avail: NTIS HC A10/MF A01 CSCL 06C

The space station will be constructed during the next decade as an orbiting, low-gravity, permanent facility. The facility will provide a multitude of research opportunities for many different users. The pressurized research laboratory will allow life scientists to study the effects of long-term exposure to microgravity on humans, animals, and plants. The results of these studies will increase our understanding of this foreign environment on basic life processes and ensure the safety of man's long-term presence in space. This document establishes initial operational requirements for the use of the Life Sciences Research Facility (LSRF) during its construction. Author

N87-15679*# Management and Technical Services Co., Washington, D.C.
USSR SPACE LIFE SCIENCES DIGEST, ISSUE 9
Lydia Razran Hooke, Mike Radtke, Ronald Teeter, and Joseph E. Rowe (Library of Congress, Washington, D. C.) Washington NASA Jan. 1987 109 p
(Contract NASw-3676)
(NASA-CR-3922(10); NAS 1.26:3922(10)) Avail: NTIS HC A06/MF A01 CSCL 06B

This is the ninth issue of NASA's USSR Space Lifes Sciences Digest. It contains abstracts of 46 papers recently published in Russian language periodicals and bound collections and of a new Soviet monograph. Selected abstracts are illustrated with figures and tables from the original. Additional features include reviews of a Russian book on biological rhythms and a description of the papers presented at a conference on space biology and medicine. A special feature describes two paradigms frequently cited in Soviet space life sciences literature. Information about English translations of Soviet materials available to readers is provided. The abstracts included in this issue have been identified as relevant to 28 areas of aerospace medicine and space biology. These areas are: adaptation, biological rhythms, body fluids, botany, cardiovascular and respiratory systems, developmental biology, endocrinology, enzymology, equipment and instrumentation, gastrointestinal system, genetics, habitability and environment effects, hematology, human performance, immunology, life support systems, mathematical modeling, metabolism, microbiology, morphology and cytology, musculoskeletal system, nutrition, neurophysiology, operational medicine, perception, personnel selection, psychology, radiobiology, and space biology and medicine. Author

N87-15680# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.
INHALATION TOXICOLOGY. PART 7: TIMES TO INCAPACITATION AND DEATH FOR RATS EXPOSED CONTINUOUSLY TO ATMOSPHERIC ACROLEIN VAPOR Technical Report, Oct. 1982 - Jul. 1983
Charles R. Crane, Donald C. Sanders, Boyd R. Endecott, and John K. Abbott May 1986 27 p
(AD-A169666; FAA/AM-86/5) Avail: NTIS HC A03/MF A01 CSCL 06/20

Acrolein, an organic aldehyde ($CH_2=CH-CHO$), is extremely irritating to the respiratory passages at very low concentrations. It is known to be present in the smoke from certain materials used in aircraft cabin interiors and could contribute, therefore, to an individual's failure to escape from a burning aircraft. In order to assess acrolein's ability to produce physical incapacitation in a mammal, laboratory rats were exposed continuously to measured atmospheric concentrations of acrolein vapor until they expired.

The exposure time required to produce lethality was measured, as was the time at which physical incapacitation occurred. Incapacitation was defined operationally as loss of the ability to walk in a motor-driven wheel, which was enclosed in the exposure chamber. Dose-response curves were generated by equating these two endpoints, time-to-incapacitation and time-to-death, to the atmospheric acrolein concentration via statistically derived regression equations. Experimental results suggest that the acrolein dose that will produce physical incapacitation could be 10 to 100 times greater than has been predicted in the past. The possible relationship between the effective toxic doses of acrolein for rats, and those required for humans, is discussed. GRA

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

N87-15681*# Johns Hopkins Univ., Baltimore, Md. School of Public Health.
BEDREST IN HEALTHY WOMEN: EFFECTS OF MENSTRUAL FUNCTION AND ORAL CONTRACEPTIVES Final Report
Suzanne M. Fortney, William B. Beckett (Yale Univ., New Haven, Conn.), Neil B. Vroman (New Hampshire Univ., Durham), John Davis, John Rock, Allyn Kimbell, Norman LaFrance, and Helen Drew 1986 160 p
(Contracts NAS9-16703; NAS9-17199)
(NASA-CR-171946; NAS 1.26:171946) Avail: NTIS HC A08/MF A01 CSCL 06P

With the development of the space shuttle program, space flight for the first time is available to individuals who have not been specially selected and trained to be astronauts. In addition, women are being actively recruited into the space program, both as mission specialists and as career astronauts. One purpose of this project was to examine some of the physiological responses of women to a simulated weightlessness program (12 day horizontal bedrest), to compare their responses to those reported in men during similar programs, and to test whether menstrual function might alter some of the physiological changes which occur during bedrest, specifically changes in the plasma volume, exercise tolerance, and venous compliance before and after bedrest. E.R.

N87-15682*# Vacumetrics, Inc., Ventura, Calif. VacaMed Div.
A NEW APPROACH TO NON-INVASIVE OXYGENATED MIXED VENOUS PCO(SUB)2 Final Report
Joseph A. Fisher (Toronto Univ., Ontario) and Clifford A. Ansel 31 Mar. 1986 79 p
(Contract NAS9-17516)
(NASA-CR-171949; NAS 1.26:171949) Avail: NTIS HC A05/MF A01 CSCL 06E

A clinically practical technique was developed to calculate mixed venous CO2 partial pressure for the calculation of cardiac output by the Fick technique. The Fick principle states that the cardiac output is equal to the CO2 production divided by the arterio-venous CO2 content difference of the pulmonary vessels. A review of the principles involved in the various techniques used to estimate venous CO2 partial pressure is presented. B.G.

N87-15683*# North Carolina Univ., Chapel Hill.
BIOCHEMICAL CHANGES IN BONE IN A MODEL OF WEIGHTLESSNESS Technical Report - 1 Jan. - 31 Dec. 1986
Gerald L. Mechanic 1986 10 p
(Grant NAG2-181)
(NASA-CR-180095; NAS 1.26:180095) Avail: NTIS HC A02/MF A01 CSCL 06S

The amounts of nonmineralized and mineralized collagen in bone from control, immobilized, and immobilized reambulated monkeys were examined. In order to understand structure function relationships of bone collagen and the reponse of a variety of conditions on control of the three dimensional structure of the collagen fibril, the stereochemistry of the cross-linking reactions as well as the stereospecific packing of the collagen molecules were studied. B.G.

N87-15684# New York Univ. Medical Center. Dept. of Ophthalmology.
INTRACORTICAL INTERACTIONS IN VISUAL PROCESSING Final Report
Jeremiah I. Nelson May 1986 24 p
(Contract N62269-83-M-3126)
(AD-A169674; NADC-86066-60) Avail: NTIS HC A02/MF A01 CSCL 06/16

Microelectrodes were used to record responses from single cells in the visual system of cats, at the level of the visual cortex. Interactions were discovered and measured between the cell under study and neighboring cells, when these neighbors were stimulated with large patterns. The interactions obey specific rules. It is argued that these rules are ideal for separating and strengthening the neural response to one object from the response of myriad other neurons to a cluttered background. The next step in this project will be multielectrode array studies to isolate and identify the neurons participating in these interactions. GRA

N87-15685# School of Aerospace Medicine, Brooks AFB, Tex.
G-TOLERANCE STANDARDS FOR AIRCREW TRAINING AND SELECTION Final Report, Jan. 1977 - Mar. 1986
Kent K. Gillingham May 1986 9 p
(AD-A170441; USAFSAM-TR-86-12) Avail: NTIS HC A02/MF A01 CSCL 06/14

G tolerance varies widely among individuals. To assure that aircrew with abnormally low G tolerance are not assigned to aircraft that operate in the high-G environment, a G-tolerance standard and the means to implement that standard are necessary. Since 1977 the USAF SAM has used, in human centrifuge operations, an informal G-tolerance standard for selecting experimental subjects, evaluating medically disqualified aircrew, and ensuring efficacy of high-G training for aircrew. That standard consists of the subject's being able to sustain for 15 s a rapidly applied +7-G sub z load, without totally losing peripheral vision or losing consciousness, while wearing a functioning anti-G suit, performing an anti-G straining maneuver, and sitting in a conventionally configured fighter aircraft seat. Inability to tolerate a 7-G, 15-s, rapid-onset G profile in a centrifuge is also the basis of internationally recognized (NATO, ASCC) definitions of low G tolerance. The rationale for choosing the 7-G, 15-s standard is discussed. Experience with use of this standard and the equivalent standard of 8 G for 15 s when the F-16-configured seat is used reveals that fewer than 1% of actively flying fighter aircrew are unable to meet the standard. GRA

N87-15686# California Univ., Irvine. Dept. of Community and Environmental Medicine.
EXPLORATORY STUDY OF THE POTENTIAL EFFECTS OF EXPOSURE TO SONIC BOOM ON HUMAN HEALTH. VOLUME 2: EPIDEMIOLOGICAL STUDY Final Report, Nov. 1984 - May 1986
H. Anton-Guirgis, B. D. Culver, S. Wang, and T. H. Taylor Jun. 1986 174 p Prepared in cooperation with California Univ., Irvine
(Contract F33615-81-C-0500)
(AD-A170953; AAMRL-TR-86-020-Vol-2) Avail: NTIS HC A08/MF A01 CSCL 06/19

A study has been carried out to investigate possible human health effects caused by exposure of people to sonic boom. The subjects of the study were the residents of Nevada. This state was selected for the study because supersonic military flight operations have been carried out in Nevada, primarily within the boundaries of the Tactical Fighter Weapons Center (TFWC) Range Complex near Las Vegas, longer than in any other area within the United States. This volume presents the results of an epidemiological study to search for any health effects. The health effects study was built entirely on a statewide epidemiologic evaluation of mortality for Nevada residents from 1968 to 1983, supplemented by hospital discharge morbidity data. The results of the statewide study revealed no convincing evidence to prove or

disprove any relationship between exposure to sonic boom and adverse health phenomena. Statewide, age-adjusted mortality in Nevada is unremarkable compared to national figures. Crude death rates did vary directly with exposure to sonic booms but this relation disappeared when mortality was age-adjusted. Analyses of time trends and bivariate linear regressions failed to yield convincing associations between sonic boom exposure and age-adjusted mortality. Access to a population of weapons-range workers and to their health records, which was an additional key component of the research study, was not granted. GRA

N87-15687# New York Univ., New York.
THE PERCEPTION OF THE HIGHER DERIVATIVES OF VISUAL MOTION Final Scientific Report, 1 Jan. 1982 - 31 Sep. 1985
Lloyd Kaufman and Samuel J. Williamson 24 Jun. 1986 85 p
(Grant AF-AFOSR-0050-82)
(AD-A171076; AFOSR-86-0515TR) Avail: NTIS HC A05/MF A01 CSCL 06/2

Sensitivity to changing speed was studied with gratings of various spatial frequencies drifting across a screen while the average velocity was modulated. Thresholds expressed either as the velocity amplitude (difference between peak and average velocities) or as the maximum acceleration, increased monotonically with average velocity. The threshold for velocity contrast (velocity amplitude divided by average velocity) actually decreased with average velocity. The velocity contrast was minimal for velocity modulation frequencies of about 2 Hz and for spatial frequencies in the range of 2-4.5 c/d. In addition to these basic findings, we failed to find any effect of selective adaptation to changing speed other than that could be attributed to smooth motion. It seems unlikely that mechanisms tuned to respond to changing speed per se are present in the human perceptual system. However, it is not possible to generalize from this to situations where higher derivatives are introduced by causing stimuli to change direction of motion. Author (GRA)

N87-15688# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
THE EFFECT OF LONG TERM MONOCULAR OCCLUSION ON VERNIER THRESHOLD: ELASTICITY IN THE YOUNG ADULT VISUAL SYSTEM M.S. Thesis
Richard J. Dennis Jun. 1986 86 p
(AD-A171289; AFIT/CI/NR-86-122T) Avail: NTIS HC A05/MF A01 CSCL 06/16

Five subjects (ages 19 to 22) were monocularly occluded for six days. Their vernier thresholds and fixation integrity measurements (using a modified Haidinger's brush) were determined at pre-occlusion, two, four, and six days of monocular occlusion, and 24 hours after patch removal. The occluded eye demonstrated a significant rise in vernier threshold after the two day occlusion period. The threshold continued at that level throughout the six day occlusion period before returning to normal within 24 hours after removal of the patch. The non-occluded eye did not show a matching enhancement effect characteristic of the competition model. Every subject also manifested an amount of eccentric fixation in the occluded eye. The eccentric fixation did not generally increase with time occluded, but did show an elastic response by returning to normal foveal fixation in 24 hours. The decrement in vernier performance in the occluded eye is probably best explained as a temporary (elastic) eccentric fixation rather than the loss of channels as theorized in the competition model. Our data did indicate a faster drop off of vernier acuity with retinal eccentricity than did the interpolated data of Westheimer's (1979) postulating that a secondary process was also contributing to the rise in threshold. GRA

N87-15689# Case Western Reserve Univ., Cleveland, Ohio.
ATTENTION AND PREPARATORY PROCESSES IN THE CENTRAL NERVOUS SYSTEM Final Report, 13 Jun. 1983 - 12 Jun. 1986
Vernon Rowland and Henry Gluck Aug. 1986 4 p
(Contract DAAG29-83-K-0089)
(AD-A171316; ARO-20472.3-LS) Avail: NTIS HC A02/MF A01 CSCL 05/10

Efforts were directed toward improved understanding of the slow potential (SP) of the brain. This electrically recordable dynamic differs from the conventional EEG in being nonrhythmic and of durations from 1 to many fold longer than the longest enduring components of the EEG. It is best elicited by use of motivating (conditioned) stimuli and by signals (conditioning stimuli) related to them in the learning process. A study was made of the relation of multiple firing potentials of neurons to the SP as both are related to temporal (fixed interval) conditioning controlled by medial forebrain bundle (MFB) electrical reward in the rat. A correlation was observed of the pacing of the level of expectancy in the trained subject with the SP, which, in this context, has been termed the Anticipatory Potential Gradient or APG. GRA

N87-15690# EIC, Inc., Norwood, Mass.
DEVELOPMENT OF N(2) SENSOR FOR DETERMINATION OF PN(2) IN BODY TISSUES Final Report, 15 Jun. 1983 - 14 Jun. 1986
Lois S. Robblee, Thomas J. Lewis, Richard B. Salmonsen, Patricia A. Huminski, and Michael S. Blankinship Aug. 1986 47 p
(Contract N00014-83-C-0458)
(AD-A171330; C-731; ONR-0458(F)) Avail: NTIS HC A03/MF A01 CSCL 07/4

Experiments were performed to identify transition metal ion-dinitrogen complex systems whose chemical and electrochemical properties would be favorable for use in quantitating PN2, and to develop methods of immobilizing those metal ions so that the reactions of interest would take place on an electrode surface. A N2 sensing system was developed which is comprised of an ion exchange polymer membrane (Nafion), containing Ru(III) cations coated onto a glassy carbon electrode. The electrode is activated for N2 measurement by applying a reducing potential to generate the N2-complexing Ru(II) cation on the electrode surface. The surface Ru(II) cation reacts with N2 in solution to form a surface RU(II)-N2 complex. This complex is electrochemically detectable and distinguishable from the RU(II) precursor. At short times, the reaction follows first-order kinetics with a rate constant 10 times greater than for the equivalent homogeneous reaction. The reaction rate is proportional to PN2 up to 8 atm and possibly higher. The sensitivity approaches 1/10 atmosphere and the minimum electrode respons e time at elevated PN2 is 10 sec. This N2 sensing system holds promise for eventual configuration into an implantable unit for in situ measurements of tissue PN2 during compression and decompression of an experimental animal. GRA

N87-15691# Catholic Univ. of America, Washington, D.C. Human Performance Lab.
SPATIAL SCALE IN IMAGE DETECTION AND RECOGNITION
James H. Howard, Jr. Feb. 1986 60 p
(Contract N00014-83-K-0481)
(AD-A171348; TR-86-25-ONR) Avail: NTIS HC A04/MF A01 CSCL 05/8

Considerable recent physiological and psychophysical evidence suggests that the visual system operates as a series of independent channels or analyzers, each sensitive to image structure at a different spatial scale. In this view, image structure is processed separately at different scales by the various channels. Several individuals have argued that the broad, low-frequency channels respond to global or Gestalt properties of an image and are important in early processing--for instance, during an initial glance at an image. In constrast, the high-frequency channels are sensitive to local detail and are important in later visual processing when attention has been focused on a particular aspect of the image. Two experiments investigated the ability of human observers to detect and recognize simple objects in visual images. Prior to presentation, the images were transformed by spatial frequency filters to emphasize the global- (low spatial frequencies), local- (high spatial frequencies) or intermediate- (mid spatial frequencies) scale structure. Four categories of top-view ship hulls were synthesized for the experiments. In the first experiment separate groups of observers made both detection (which quadrant of the display contained a ship?) and recognition (which of the four ships occurred?) judgements. In the second experiment,

observers also selected the filter condition to be display on each trial prior to the detection or recognition response. GRA

N87-15692# Technion - Israel Inst. of Tech., Haifa.
MODELS OF CEREBRAL SYSTEM MECHANICS Final Report
S. Sorek, J. Bear, Z. Karni, and M. Feinsod 20 Jul. 1986 121 p
(Grant AF-AFOSR-0233-85)
(AD-A171483; EOARD-TR-86-07; SR-2) Avail: NTIS HC A06/MF A01 CSCL 06/16

A model of a system is a simplified version of the real system. The simplification is done by introducing a set of assumptions that express our understanding of the system's behavior. In the process of simplification, we omit non-dominant effects, leaving the main features of the system. The objective of simplification is to obtain a set that can be solved by available tools and still maintain the main characteristics of the real system. The model is a tool that provides forecasts of the response of the real system to various excitations. Thus it is essential that the model retains those features that are the subject of investigations. This volume contains 7 papers dealing with models of brain mechanics. The objective of the models is to provide a tool for simulating the mechanical behavior of the cerebral system, as manifested by pressure, velocity, stress and strain variations, in response to changes in input pressures and fluxes. GRA

N87-15693# Naval Aerospace Medical Research Lab., Pensacola, Fla.
NOISE SUSCEPTIBILITY: A COMPARISON OF TWO NAVAL AVIATOR POPULATIONS Final Report
Gerald B. Thomas and Carl E. Williams Jun. 1986 20 p
(AD-A172222; NAMRL-1320) Avail: NTIS HC A02/MF A01 CSCL 06/19

The identification of characteristics of noise susceptible or noise resistant individuals is necessary for the development of noise susceptibility risk profiles. Fifty-six Naval aviators, categorized as having either incurred a hearing loss (i.e., hearing threshold levels greater than 40 dB at 4000 to 8000 Hz) or retained normal hearing (i.e., hearing threshold levels less than or equal to 25 dB at 125 to 8000 Hz) after thousands of flight hours were compared along several auditory and non-auditory dimensions. The following variables occurred differentially in the two groups: Minimal Auditory Intensity Differential (MAID) scores at 2000 Hz (p less than .01) and 4000 Hz (p less than .001); iris pigmentation (blue eyes were overrepresented in the noise susceptible group; p less than .05); blood type (type A occurred more often in the noise susceptible population; p less than .05); systolic blood pressure (sitting; noise susceptible group was higher; p less than .05); calcium, albumin, and LDH levels (higher in the noise resistant group; p less than .05); and present tobacco usage (more noise-susceptible aviators were currently smokers; p less than .05). The noise susceptible population also tended (p less than .10) to exhibit elevated cholesterol and triglyceride levels, higher contralateral acoustic reflexes, and had fewer individuals who had never smoked. Although no classic profile of the noise susceptible or noise resistant individual definitively emerged, results suggested that at least one measurement device (MAID test) may serve as an early warning sign. GRA

N87-15694# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
A THEORETICAL STUDY OF THE ELECTROMAGNETIC FIELDS IN A LIMB, EXCITED BY ARTIFICIAL SOURCES
A. M. J. vanAmelsfort and Th. Scharten Feb. 1986 81 p
(EUT-86-E-156; ISBN-90-6144-156-0; ISSN-0167-9708; ETN-86-98712) Avail: NTIS HC A05/MF A01

Using integral transform techniques, a procedure to compute the electromagnetic field inside and outside a circularly cylindrical limb, excited by any electric or electromagnetic source is developed. The component layers of the limb are assumed to be homogeneous, anisotropic, and dissipative. The time-harmonic field of an axial pair of ring-shaped electrodes, located symmetrically inside the limb is calculated. The influences of anisotropy and boundaries on field distribution and surface charges are investigated. ESA

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N87-15695*# National Aeronautics and Space Administration, Washington, D.C.
ON THE PILOT'S BEHAVIOR OF DETECTING A SYSTEM PARAMETER CHANGE
N. Morizumi and H. Kimura 1986 18 p Transl. into ENGLISH from Japan Society for Aeronautical and Space Sciences Journal (Japan), v. 33, no. 380, 1985 Original language document was announced in IAA as A86-25229 Transl. by SCITRAN, Inc., Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88479; NAS 1.15:88479; ISSN-0021-4663) Avail: NTIS HC A02/MF A01 CSCL 05I

This paper deals with the detection characteristics of a human pilot, who is engaged in a compensatory control, to a sudden change in the controlled element's characteristics. Taking the case where the change manifests itself as a variance change of the monitored signal, it is shown that the detection time, defined to be the time elapsed until the pilot detects the change, is related to the monitored signal and its derivative. Then, the detection behavior is modeled by an optimal controller, an optimal estimator, and a variance-ratio test mechanism that is performed for the monitored signal and its derivative. Results of a digital simulation show that the pilot's detection behavior can be well represented by the model proposed here. Author

N87-15696# California Univ., Irvine. Congnitive Sciences Group.
MINIMUM POINTS AND VIEWS FOR THE RECOVERY OF 3-DIMENSIONAL STRUCTURE
Myron L. Braunstein, Donald D. Hoffman, Lionel R. Shapiro, George J. Andersen, and Bruce M. Bennett 20 Jun. 1986 43 p
(Contract NOOO14-85-K-0529)
(AD-A171148) Avail: NTIS HC A03/MF A01 CSCL 46/16

Mathematical analyses of motion perception have established minimum combinations of points and distinct views that are sufficient to recover three-dimensional (3D) structure from two-dimensional (2D) images, using such regularities as rigid motion, fixed axis of rotation, and constant angular velocity. To determine whether human subjects could recover 3D information at these theoretical levels, we presented subjects with pairs of displays and asked them to determine whether they represented the same or different 3D structures. Number of points was varied between 2 and 5; number of views was varied between 2 and 6; and the motion was either fixed axis with constant angular velocity, fixed axis with variable velocity, or variable axis with variable velocity. Accuracy increased with views, but decreased with points, apparently due to the increased difficulty of the comparison task as the structure became more complex. Subjects' performance exceeded theoretical expectations, implying that they exploited regularities in addition to those in the theoretical analyses. Some possible additional regularities, and possible grouping effects, are discussed. Author (GRA)

N87-15697# Arizona State Univ., Tempe.
THE EFFECTS OF RESPONSE MODALITY ON INTERFERENCE BETWEEN STIMULUS DIMENSIONS
V. G. Cuqlock and Kathryn A. Bloem Jul. 1986 25 p
(Contract DAAG29-84-K-0197)
(AD-A171177; ARO-22256.1-LS) Avail: NTIS HC A02/MF A01 CSCL 05/10

This report concerns the effects of response modality and the relation between stimulus dimensions on subjects ability to report one dimension of a multidimensional stimulus. Subjects were asked to report, as rapidly as possible, either the name or the ink color of colored words. The relation between the ink color and work was either congruent (Blue in blue ink), neutral (Door in blue ink), or incongruent (Blue in red ink). Responses were made either

manually or vocally. Results are consistent with previous findings in the area of Stroop (Stroop, 1935) research. That is, responding to one of two dimensions is more difficult when the relation between dimensions is incongruent than when the relation between dimensions is congruent or neutral. But in addition, results show that no interference from an incongruent, ink-color dimension results when subjects respond vocally to the word dimension, whereas when subjects respond manually to this dimension, the incongruence between the colors and word produce interference. Results suggest a limitation on the usefulness of a color dimension when a word dimension requires a speeded-speech response. onse. Author (GRA)

N87-15698# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Psychology.
NOVICE RULES FOR ASSESSING IMPORTANCE IN SCIENTIFIC TEXTS Interim Report, Aug. 1985 - Jul. 1986
Diana Dee-Lucas and Jill H. Larkin Aug. 1986 37 p
(Contracts MDA903-85-K-0180; DA Proj. 2Q1-61102-B-74-F)
(AD-A171551; ARI-RN-86-89) Avail: NTIS HC A03/MF A01 CSCL 05/10

Scientific texts are typically densely packed with complex content, making it particularly difficult for novice learners to identify important information. The current study found that novice readers judge importance on the basis of form (i.e., definition or fact) in which information is presented. In this study, expert and novice physicists judged the importance of sentences in physics texts when they were presented as definitions or facts. The definitions and facts were identical in content differing only in minor wording changes. Sentence form influenced the importance judgments of novices, but not those of experts. Novices judged sentences that were identical in content as more important when they were presented as definitions. These results indicate that textbook writers need to be aware of how form influences novices' perception of what is important in order to effectively guide attention to critical text content. Techniques for altering readers' attention (i.e., signaling and strategy instruction) are discussed. GRA

N87-15699# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
HUMAN REAL TIME PERCEPTION IN NOISE
Michael J. Stock, Charles W. Nixon, Vernie G. Fisher, III, and Charles D. Goodyear 20 Aug. 1986 41 p
(AD-A172374; AAMRL-TR-86-034) Avail: NTIS HC A03/MF A01 CSCL 20/1

A novel device, the Real Time Perception Analyzer (RTPA), has been developed to measure the perception of real time as well as simple and choice reaction time under microgravic conditions on board the space shuttle. This study examined only real time perception; reaction times were not measured. The RTPA real time perception task produces a target dot that moves from left-to-right across a narrow, horizontal light bar. A vertical marker is positioned almost two inches beyond the right end of the light bar. The subject's task is to push a switch when it is estimated that the target dot has moved beyond the end of the light bar, a region where the dot is no longer visible, and reached the vertical marker. Sixteen subjects performed the time perception task under various conditions of quiet and noise exposure. Errors consisted of underestimations or overestimations of the actual time intervals which ranged from 1.75 to 14.0 seconds. Results indicate that subjects overestimated time intervals and that the greatest errors occurred for the shortest time intervals and in noises that changed during the task. Also, female subject estimates of time intervals were consistently shorter than those of the male subjects. These findings are compared to earlier research on time estimation and verify that the RTPA provides a reliable and sensitive measure of the perception of real time in noise. Author (GRA)

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

For related information see also *16 Space Transportation.*

N87-15700 Florida Univ., Gainesville.
ADAPTIVE CONTROL OF ROBOTIC MANIPULATORS Ph.D. Thesis
L. Sabri Tosunoglu 1986 269 p
Avail: Univ. Microfilms Order No. DA8618692

Currently industrial robot manipulators operate slowly to avoid dynamic interactions between links. Typically each joint is controlled independently and system stability and precision are maintained at the expense of underutilizing these systems. As a result, productivity is limited, and more importantly, the lack of reliability has hindered investment and wider industrial use. This work addresses the adaptive control of spatial, serial manipulators. Centralized adaptive controllers which yield globally asymptotically stable systems are designed via the second method of Lyapunov. Actuator dynamics is also included in the system model. Lagrange equations are used in deriving dynamic equations for n-link, spatial robot manipulators which are modeled with rigid links connected by either revolute or prismatic pairs. Although manipulators may exhibit structural flexibility, the rigid link assumption is justified, because control of manipulators needs to be understood precisely before flexibility is included. The plant, which represents the actual manipulator, and the reference model, representing the ideal robot, are both expressed as distinct, nonlinear, coupled systems. Error-driven system dynamics is then written and adaptive controllers which assure global asymptotic stability of the system are given utilizing the second method of Lyapunov. It is shown that these control laws also lead to asymptotically hyperstable systems. Integral feedback is introduced to compensate for the steady-state system disturbances. Dissert. Abstr.

N87-15701# Report Store, Lawrence, Kans.
SURVEY OF ERGONOMICS DATABASES IN MEMBER COUNTRIES OF THE INTERNATIONAL ERGONOMICS ASSOCIATION Final Report, 1 Oct. 1985 - 1 Jul. 1986
B. Williams and L. Wascher 1 Jul. 1986 56 p
(Contract DAAL02-86-P-1599)
(AD-A171142; HEL-FI-5-86) Avail: NTIS HC A04/MF A01 CSCL 05/2

This report surveys the status of ergonomics databases in the member countries of the International Ergonomics Association. Most ergonomic data is available only in the literature where it was first reported. Few formal data collections exist and very few computerized databases were found in this survey. Handbooks and textbooks are still the main sources of collected ergonomics data. Anthropometry is the only body of information in which we found significant collections of international data currently available in computerized form. Most ergonomics data are still embedded in the published literature. Recent use of the computer for ergonomics data gathering and data analysis has created the potential for previously existing limited studies of small populations to be extended into entirely new automated databases, but this potential has not been realized. After reviewing the strengths and weaknesses of available published data compendia and then describing the few large scale databases found in the survey, this report presents some examples of how existing data-gathering systems could be used to build new automated databases. GRA

N87-15702# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
USE OF DISJUNCTIVE RESPONSE REQUIREMENTS IN DUAL-TASK ENVIRONMENTS: IMPLICATIONS FOR AUTOMATION Ph.D. Thesis
Robert J. Schoen May 1986 107 p
(AD-A171277; AFIT/CI/NR-86-133D) Avail: NTIS HC A06/MF A01 CSCL 05/10

Two experiments were conducted to assess the difference in

resource requirements for choice and disjunctive (Donders Type c) responses in a dual-task environment. Experiment 1 utilized two binary tasks paired in all possible combinations of choice and disjunctive response requirements. For both tasks the disjunctive responses were faster and less error prone with the additional benefit of improving performance on the concurrent task. Experiment 2, using a primary-secondary dual-task paradigm, contrasted the resource cost of responding to the cost of not responding to stimuli that had varying degrees of similarity to the go stimuli. Results demonstrated a high degree of operator involvement in terms of resource use even when a response was not required. These results were discussed in terms of reducing operator workload within a semiautomated multitask environment by employing disjunctive responding in place of binary choice responding. Author (GRA)

N87-15703# Arizona State Univ., Tempe.
THE USE OF INTERACTIVE VOICE SYSTEMS TO IMPROVE MULTIPLE-TASK PERFORMANCE Final Report, Jan. 1982 - Aug. 1986
Diane L. Damos 15 Aug. 1986 23 p Prepared in cooperation with the University of Southern California, Los Angeles
(Contract NOOO14-82-C-0179)
(AD-A171492; Rept-916416-FTN) Avail: NTIS HC A02/MF A01 CSCL 17/2

The primary purpose of this contract was to examine the effect of voice generation and recognition systems on dual-task performance although three other research efforts on complementary topics also were investigated. This report is divided into four sections. The first section provides background information for the first experiments conducted under this contract. The second section describes each of the six experiments examining the effect of voice generation and recognition systems on dual-task performance and summarizes their results. The third section briefly discusses three other research efforts performed on this contract in support of current activities at the Naval Biodynamics Laboratory and the Naval Aerospace Medical Research Laboratory. The last section lists the products of the contract. GRA

55 SPACE BIOLOGY

Includes exobiology; planetary biology; and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

No abstracts in this category.

60 COMPUTER OPERATIONS AND HARDWARE

Includes hardware for computer graphics, firmware, and data processing.

For components see *33 Electronics and Electrical Engineering.*

N87-15704*# National Aeronautics and Space Administration, Washington, D.C.
TEST PROCESSING SYSTEM (SEE)
P. Gaulene Sep. 1986 26 p Transl. into ENGLISH of "Systeme d'Exploitation d'Essais (SEE)" rept. Aerospatiale Helicopter Div. p 1-25 Transl. by Kanner (Leo) Associates, Redwood City, Calif. (Contract NASw-4005)
(NASA-TM-88514; NAS 1.15:88514) Avail: NTIS HC A03/MF A01 CSCL 09B

The SEE data processing system, developed in 1985, manages and process test results. General information is provided on the SEE system: objectives, characteristics, basic principles, general organization, and operation. Full documentation is accessible by computer using the HELP SEE command. Author

N87-15376# Racal-Decca Advanced Development Ltd., Walton-on-Thames (England).
ON-BOARD PROCESSING PAYLOAD TECHNOLOGY FOR AN EUROPEAN LAND MOBILE SATELLITE SYSTEM
I. E. Casewell *In* ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 67-74 Sponsored by ESA (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, algorithms, and specific applications, e.g., CAD/CAM.

N87-15705 Connecticut Univ., Storrs.
OPTIMIZATION OF CONTINUUM STRUCTURES USING A BOUNDARY ELEMENT FORMULATION Ph.D. Thesis
James H. Kane 1986 154 p
Avail: Univ. Microfilms Order No. DA8619125

An analytical formulation and its implementation in a computer program for shape optimization of continuum structures is described, including geometry, analysis, sensitivity analysis, numerical optimization, and computer graphics. Major innovations are as follows: a boundary element formulation for plane strain or plane stress is used for the structural analysis; implicit differentiation of the discretized boundary integral equations is used to produce a form of design sensitivity analysis; and a multizone analysis strategy is employed to effectively exploit the significant sparsity of the matrices associated with the design sensitivity analysis. It is shown that this approach is accurate and computationally efficient. The most significant outcome of this effort is the clear demonstration that the boundary element formulation, when properly implemented is competitive, if not superior, to the finite element formulation for shape optimization of linear elastic solid objects. Dissert. Abstr.

N87-15706# British Aerospace Dynamics Group, Stevenage (England). Engineering Computer Sciences Dept.
THE ROLE FOR ENTROPY AND INFORMATION IN SOFTWARE RELIABILITY
B. G. Anderson Apr. 1986 33 p
(BAe-ST-30581; ETN-86-98381) Avail: NTIS HC A03/MF A01

Entropic and informational techniques suitable for representing probability distributions in software reliability problems are discussed. The entropic technique is distribution-free in the sense that it makes no assumption about the distribution of variate, y. This makes the method ideal for the study of software reliability and growth models. The method makes no assumptions outside the available data, which reduces the production of artifacts. The introduction of prior information is much simpler than the usual Bayesian approach. The probability distributions and their inverses are simple to evaluate, which is particularly useful when Monte-Carlo generation of random-numbers is being performed to an empirical distribution. Estimation of parameter accuracy is a viable proposition and probability statements can be made regarding the range of an estimate. Time-varying data can be incorporated, resulting in time-varying Lagrangian multipliers and nonhomogenous processes. ESA

N87-15707# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Computer Science/Dept. of Software Technology.

GENERATION OF INTERACTIVE PROGRAMMING ENVIRONMENTS (GIPE) Intermediate Report

Jan Heering, ed., Jacqueline Sidi, ed. (Societe d'Economie et de Mathematique Appliquees, Montrouge (France).), and Ard Verhoog, ed. (BSO/Automation Technology B.V., Utrecht (Netherlands).) May 1986 368 p Sponsored by the European Economic Commission ESPRIT Project 348

(CWI-CS-R8620; ETN-87-98677) Avail: NTIS HC A16/MF A01

The efficiency of the equation interpreter compared with the UNH PROLOG interpreter; two window systems; syntax directed editing of Le-LISP; interfaces between LISP and PROLOG; interfaces between LISP and ASH; the virtual tree processor; user definable syntax for specification languages; specifications in natural semantics; an algebraic semantics definition formalism; an environment generation system; and partial evaluation and omega-completeness of algebraic specifications are discussed. For individual titles, see N87-15708 through N87-15721.

N87-15708# Center for Mathematics and Computer Science, Amsterdam (Netherlands).

GENERATION OF INTERACTIVE PROGRAMMING ENVIRONMENTS (GIPE). OUTLINE OF THE GIPE PROJECT

Jan Heering, G. Kahn (Institut National de Recherche d'Informatique et d'Automatique, Valbonne (France).), P. Klint, and B. Lang (Institut National de Recherche d'Informatique et d'Automatique, Rocquencourt (France).) *In its* Generation of Interactive Programming Environments (GIPE) May 1986 11 p (For primary document see N87-15707 07-61)

Avail: NTIS HC A16/MF A01

A project to investigate the possibilities for automatically generating interactive programming environments from language specifications is outlined. It aims to create a software environment that allows experimenting with formalisms for specifying various aspects of structured, formalized objects; to evaluate the adequacy of formalisms for the specification of various aspects of programming languages and interactive programming environments; and to create interfaces and a software architecture for the integration of selected language specification formalisms in a single system; to manipulate large formal specifications, to incrementally maintain their consistency, and to compile such specifications into executable programs; and to design and implement a prototype system for the generation of interactive programming environments from language specifications. ESA

N87-15709# BSO/Automation Technology B.V., Utrecht (Netherlands).

ESTABLISHMENT OF A COMMON ENVIRONMENT. DELIVERABLE D1 OF TASK T1 - SECOND REVIEW Intermediate Report, Jan. 1986

Ard Verhoog and G. Kahn *In* Center for Mathematics and Computer Science Generation of Interactive Programming Environments (GIPE) May 1986 5 p (For primary document see N87-15707 07-61)

Avail: NTIS HC A16/MF A01

The building of a shared software environment for experimenting with language specification techniques is discussed. The environment is constructed around the Unix operating system. Other components selected are Le-LISP, CEYX, C-PROLOG and MENTOR. ESA

N87-15710# BSO/Automation Technology B.V., Utrecht (Netherlands).

A COMPARISON OF TWO WINDOW SYSTEMS

Ard Verhoog *In* Center for Mathematics and Computer Science Generation of Interactive Programming Environments (GIPE) May 1986 11 p (For primary document see N87-15707 07-61)

Avail: NTIS HC A16/MF A01

The Brown Workstation Environment (BWE) A Screen Handler (ASH) computer program window and Lucasfilm are compared. The ASH is a relatively low level, but very complete, set of routines, while Lucasfilm is of a relatively high level, but has shortcomings. The fact that neither system suffices as a window system interface on the application level suggests that a higher level interface must be defined. This Window Interface for generation of Interactive Programming Environments (WIG) will resemble the set of functions in Lucasfilm, but will include ASH aspects. The WIG will/should enable the porting of applications to hardware supporting other window systems. An example is presented in the BWE and Lucasfilm setting, with complete lists of the routines present in the two systems. ESA

N87-15711# Societe d'Economie et de Mathematique Appliquees, Montrouge (France).

SYNTAX DIRECTED EDITING OF LELISP. ANNEXE D1.A3 OF DELIVERABLE D1 - SECOND REVIEW

D. Clement *In* Center for Mathematics and Computer Science Generation of Interactive Programming Environments (GIPE) May 1986 10 p (For primary document see N87-15707 07-61)

Avail: NTIS HC A16/MF A01

Aspects of LISP relevant to syntax directed editing are outlined. The general principles followed in the design of a MENTOR editor to deal with the LeLISP/CEYX language are summarized. Experiments carried out on a large variety of LISP programs show that these principles are insufficient. Interactions between the editor and the LeLISP environment are too weak to make the system practical. However, experience indicates that a LISP syntax directed editor is feasible in the context of the environment generator under development. ESA

N87-15712# Societe d'Economie et de Mathematique Appliquees, Montrouge (France).

DEFINITION OF COMMON INTERFACES. DELIVERABLE D2 OF TASK T2 Final Report

D. Clement, T. Despeyroux (Institut National de Recherche d'Informatique et d'Automatique, Valbonne (France).), M. Devin, L. Gallot, and B. Lang *In* Center for Mathematics and Computer Science Generation of Interactive Programming Environments (GIPE) May 1986 3 p (For primary document see N87-15707 07-61)

Avail: NTIS HC A16/MF A01

Interfaces between LISP and PROLOG, and LISP and A Screen Handler (window) are discussed. Properties of a virtual tree processor are considered. The UNIX operating system is used. ESA

N87-15713# Societe d'Economie et de Mathematique Appliquees, Montrouge (France).

INTERFACES BETWEEN LISP AND PROLOG. DELIVERABLE D2.A1 OF TASK 2

D. Clement and T. Despeyroux (Institut National de Recherche d'Informatique et d'Automatique, Valbonne (France).) *In* Center for Mathematics and Computer Science Generation of Interactive Programming Environments (GIPE) May 1986 14 p (For primary document see N87-15707 07-61)

Avail: NTIS HC A16/MF A01

The specification of an interface between Le-LISP and C-PROLOG is described. The proposal is based on understanding gained in experiments carried out with the TYPOL language on Multics (HB68), interfacing MENTOR with PROLOG/P, a PROLOG system written in PASCAL, then on the SM90 (Bull SPS7), and interfacing MENTOR with C-PROLOG. ESA

N87-15714# Institut National de Recherche d'Informatique et d'Automatique, Valbonne (France).

INTERFACES BETWEEN LISP AND A SCREEN HANDLER (ASH). DELIVERABLE D2.A2 OF TASK T2

M. Devin and L. Gallot *In* Center for Mathematics and Computer Science Generation of Interactive Programming Environments (GIPE) May 1986 13 p (For primary document see N87-15707 07-61)

Avail: NTIS HC A16/MF A01

Interfacing LISP with the A Screen Handler (ASH) window package is described. The first step is accomplished by linking

ASH and Le-LISP codes either with static linking or dynamic linking. The use of static linking provides a less time consuming call of the whole system ASH-Le-LISP. To realize an effective connection one has to map ASH entry points to Le-LISP functions. This is done with the DEFASH primitive of LeLISP (which uses a built-in primitive DEFEXTERN). Thus the DEFASH function is the essential part of the interface. ESA

N87-15715# Institut National de Recherche d'Informatique et d'Automatique, Rocquencourt (France).
THE VIRTUAL TREE PROCESSOR. DELIVERABLE D2.A2 OF TASK T2
B. Lang *In* Center for Mathematics and Computer Science Generation of Interactive Programming Environments (GIPE) May 1986 31 p (For primary document see N87-15707 07-61)
Avail: NTIS HC A16/MF A01

The organization of the Virtual Tree Processor (VTP) is described. The VTP is object oriented, i.e., it is structured as a collection of classes (in the Simula-67 or Smalltalk sense). Each class is characterized by: an abstract domain of values (either pure values or modifiable objects); a collection of primitive functions and procedures operating on the values of the class, either alone or in conjunction with values of other classes; a specification of an internal representation (in remanent or persistant memory) of the value belonging to the class; and a unique class name. The internal representation in central memory of the values belonging to the class is not part of the specification, and it may change from implementation to implementation. ESA

N87-15716# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
PROPOSAL FOR A LANGUAGE DEFINITION FORMALISM AND SELECTION OF TEST CASES. DELIVERABLE D4 OF TASK T4 - SECOND REVIEW
Jan Heering, G. Kahn (Institut National de Recherche d'Informatique et d'Automatique, Valbonne (France).), and P. Klint *In its* Generation of Interactive Programming Environments (GIPE) May 1986 4 p (For primary document see N87-15707 07-61)
Avail: NTIS HC A16/MF A01

An initial version of the language definition formalism required by a project to generate interactive programming environments from formal language definitions was developed. The scope of this formalism and its various subformalisms is defined, and criteria for selecting examples to be used as test cases for them are identified. ESA

N87-15717# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
USER DEFINABLE SYNTAX FOR SPECIFICATION LANGUAGES. ANNEXE D4.A1 OF DELIVERABLE D4
Jan Heering and P. Klint *In its* Generation of Interactive Programming Environments (GIPE) May 1986 40 p (For primary document see N87-15707 07-61)
Avail: NTIS HC A16/MF A01

A formalism which allows concrete and abstract syntax of specification (and other) languages to be defined simultaneously is introduced. The formalism can be combined with a variety of specification languages. By doing so these obtain fully general user definable syntax. Examples of this are given in the context of algebraic specifications. ESA

N87-15718# Societe d'Economie et de Mathematique Appliquees, Montrouge (France).
SPECIFICATIONS IN NATURAL SEMANTICS. DELIVERABLE D4 OF TASK T4, ANNEX 2
D. Clement, J. Despeyroux (Institut National de Recherche d'Informatique et d'Automatique, Valbonne (France).), T. Despeyroux, L. Hascoet, and G. Kahn *In* Center for Mathematics and Computer Science Generation of Interactive Programming Environments (GIPE) May 1986 64 p (For primary document see N87-15707 07-61)
Avail: NTIS HC A16/MF A01

Experiments in describing programming languages carried out in the style of natural semantics are reviewed. The experiments cover static semantics, translation, and dynamic semantics. ESA

N87-15719# Amsterdam Univ. (Netherlands).
PROPOSAL FOR AN ALGEBRAIC SEMANTICS DEFINITION FORMALISM. ANNEXE D4.A3 OF DELIVERABLE D4 - SECOND REVIEW
J. A. Bergstra, N. W. P. vanDiepen (Center for Mathematics and Computer Science, Amsterdam (Netherlands).), Jan Heering, P. H. R. Hendriks, P. Klint, and Ard Verhoog *In* Center for Mathematics and Computer Science Generation of Interactive Programming Environments (GIPE) May 1986 98 p Expanded version of CWI-CS-R8504 (For primary document see N87-15707 07-61)
(CWI-CS-R8504) Avail: NTIS HC A16/MF A01

An algebraic definition formalism to be used in the static constraints and dynamic semantics sections of formal language definitions is proposed. Test cases for assessing its suitability for describing language features are presented. An example illustrating the style of specification in this formalism is given. ESA

N87-15720# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
GLOBAL OUTLINE OF AN ENVIRONMENT GENERATION SYSTEM. DELIVERABLE D5 OF TASK T5 - SECOND REVIEW
Jan Heering, P. Klint, B. Lang (Institut National de Recherche d'Informatique et d'Automatique, Rocquencourt (France).), and Ard Verhoog *In its* Generation of Interactive Programming Environments (GIPE) May 1986 9 p (For primary document see N87-15707 07-61)
Avail: NTIS HC A16/MF A01

A programming environment generator based on language definitions sufficiently detailed to enable the system to derive programming environments from them permitting editing, analysis, and execution of programs in the corresponding languages is outlined. The word language is understood as meaning a language (for instance, for expressing programs, specifications, or database queries) characterized by an abstract syntax, i.e., a standard syntactical representation of its programs by labelled trees. Each language may possess a semantics and a variety of properties or representations that have to be specified to the generator. New languages can be defined by a language definition formalism (LDF). A language definition in LDF should at least define the abstract syntax of the language. Concrete syntax, rules for pretty-printing, static (type) constraints, and dynamic semantics may be specified according to need or feasibility. ESA

N87-15721# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
PARTIAL EVALUATION AND OMEGA-COMPLETENESS OF ALGEBRAIC SPECIFICATIONS. ANNEXE D5.A1 OF DELIVERABLE D5 - SECOND REVIEW
Jan Heering *In its* Generation of Interactive Programming Environments (GIPE) May 1986 9 p Revised Submitted for publication (For primary document see N87-15707 07-61)
(CWI-CS-R8501) Avail: NTIS HC A16/MF A01

A program P(x,y) with two arguments, whose first argument has a known value c, but whose second argument is not yet known is considered. Partial evaluation of P(c,y) results in a specialized residual program Pc(y) in which as much as possible is computed on the basis of c. This is often expressed by saying that partial evaluation amounts to making maximal use of incomplete information. A precise meaning is given to this notion in the context of equational logic, initial algebra specification, and term rewriting systems. If maximal propagation of incomplete information is to be achieved within this context, as a first step it is necessary to add equations to the algebraic specification in question until it is omega-complete (if ever). The basic properties of omega-complete specifications are discussed, and examples of omega-complete specifications and specifications that do not have a finite omega-complete enrichment are given. ESA

N87-15722*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

USER'S GUIDE TO PROGRAMMING FAULT INJECTION AND DATA ACQUISITION IN THE SIFT ENVIRONMENT
Carl R. Elks (PRC Kentron, Inc., Hampton, Va.), David F. Green, and Daniel L. Palumbo Jan. 1987 54 p
(NASA-TM-87638; NAS 1.15:87638) Avail: NTIS HC A04/MF A01 CSCL 09B

Described are the features, command language, and functional design of the SIFT (Software Implemented Fault Tolerance) fault injection and data acquisition interface software. The document is also intended to assist and guide the SIFT user in defining, developing, and executing SIFT fault injection experiments and the subsequent collection and reduction of that fault injection data. It is also intended to be used in conjunction with the SIFT User's Guide (NASA Technical Memorandum 86289) for reference to SIFT system commands, procedures and functions, and overall guidance in SIFT system programming. Author

N87-15723# Morehouse Coll., Atlanta, Ga. Statistical Lab.
Ada APPLICATIONS TO REAL-TIME COMPUTER SYSTEMS Final Report, 1 Sep. 1981 - 30 Sep. 1985
Arthur M. Jones May 1986 16 p
(Grant DAAG29-81-G-0013)
(AD-A169493; ARO-18680.1-EL-H) Avail: NTIS HC A02/MF A01 CSCL 09/2

This research effort comprised four separate, but related projects. Each project was designed either to promote the dissemination of Ada within the academic community or to study the fitness of Ada for real-time programming applications. The work was divided into four projects, including Maintainable Real-Time Systems; Elementary Mathematical Subroutines Library; An Ada Compiler for Microcomputers; and Ada Techniques training/Education. GRA

N87-15724# Naval Research Lab., Washington, D. C.
AN INVESTIGATION OF EXPERT SYSTEMS USAGE FOR SOFTWARE REQUIREMENTS DEVELOPMENT IN THE STRATEGIC DEFENSE INITIATIVE ENVIRONMENT Interim Report, May - Jul. 1985
Yi-Tzuu Chien and Jay Liebowitz 10 Jun. 1986 30 p
(AD-A169659; NRL-8968) Avail: NTIS HC A03/MF A01 CSCL 09/2

The Strategic Defense Initiative (SDI) poses a significant challenge to the United States, namely how to counter the threat of Soviet nuclear ballistic missiles. Part of the solution to this problem involves the development of sophisticated automatic programming techniques. Embedded within these techniques is how to develop and check the consistency of evolving SDI-related software requirements. This report addresses what has been done in developing tools for software requirements determination and what has to be done in developing future software requirements tools for the SDI environment. The use of expert systems is an inherent part of these considerations. This report first develops a basic foundation for software design. Specifically, its definition, emergence, description, and methodologies and tools are addressed. Afterwards, the SDI environment and its associated problems are described. Then, recommendations for a knowledge-based software requirements development approach are explained. GRA

N87-15725# Stanford Univ., Calif. Dept. of Computer Science.
A DECENTRALIZED NAMING FACILITY
David R. Cheriton and Timothy P. Mann 1 Feb. 1986 31 p
(Contract N00039-83-K-0431)
(AD-A170937; STAN-CS-86-1098) Avail: NTIS HC A03/MF A01 CSCL 09/2

A key component in distributed computer systems is the naming facility: the means by which high-level names are bound to objects and by which objects are located given only their names. This document describes the design, implementation, and performance of a decentalized naming facility, in which the global name space and name mapping mechanism are implemented by a set of cooperating peers, with no central authority. Decentalization is shown to lend increased extensibility and reliability to the design. Efficiency in name mapping is achieved through specialized caching techniques. Author (GRA)

N87-15726# SRI International Corp., Menlo Park, Calif.
A REWRITE RULE MACHINE. PROGRAMMING BY GENERIC EXAMPLE Final Report
Joseph A. Goguen Jul. 1986 20 p
(Contracts N00014-82-C-0333; N00014-85-C-0417)
(AD-A171074) Avail: NTIS HC A02/MF A01 CSCL 09/2

This paper presents some techniques for programming with iconic representations. These techniques promise to make programming in suitable ultra high level languages significantly easier and more intuitive. The languages that we have in mind are based on rewrite rules and/or object-oriented programming, and have user-definable abstract data types. One technique uses the notion of constructor (from the theory of algebraic specifications of abstract data types) to automatically generate graphical representations for data values. Another technique permits defining rewrite rules, as well as methods (in the sense of object-oriented programming), but the direct manipulation of iconic representations of genetic examples of data values. Some illustrations are given, based on the OBJ functional programming language and its extension to object-oriented programming. Author (GRA)

N87-15727# Pittsburgh Univ., Pa. Inst. for Computational Mathematics and Applications.
IRREGULAR WAVEFRONTS IN DATA-DRIVEN DATA-DEPENDENT COMPUTATIONS
Rami G. Melhem Jun. 1986 13 p
(Contract N00014-85-K-0339)
(AD-A171151; ICMA-86-94) Avail: NTIS HC A02/MF A01 CSCL 09/2

This paper considers networks in which the execution time of local cycles depends on the input data. Typically, this may occur if the local cycles contain branching statements. Although data driven networks are self-synchronized, and hence, local cycles are allowed to have different execution times, it is not obvious that the execution of the entire network may benefit from the fast execution of some local cycles. More specifically, internal data conflict may force a potentially short local cycle to wait extensively for its input. The study of speed and efficiency of data driven networks with data dependent operations is extremely hard due to the asynchronous nature of the networks. Hence, we suggest a technique for the estimation of a lower bound on the performance of such networks. Namely, we introduce a simpler, hypothetical, type of computations, which we call pseudo-systolic. It alternates between communication and processing phases. Clearly, the additional synchronization may only slow down execution, and hence, the analysis of pseudo-systolic computations provide upper bounds on the execution time of the corresponding data driven computations. GRA

N87-15728# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
THE EFFECTIVENESS OF JACKSON NETWORKS AS CONTROL VARIATES FOR QUEUEING NETWORK SIMULATION M.S. Thesis
Anthony P. Sharon 1986 101 p
(AD-A171280; AFIT/CI/NR-86-129T) Avail: NTIS HC A06/MF A01 CSCL 12/2

Control variates based on Jackson networks are investigated for variance reduction in open queueing network simulations. Two types of control variates are studied: an external obtained from simulating a similar Jackson network, and a new analytic control derived from the parametric equations of the Jackson model. The analytic control eliminates the need for a second simulation required of true external controls. The analytic controls showed considerable promise for reducing the variance of server utilizations, but indicated the need for additional study of the effects of batch size and network structure on control variate performance. Author (GRA)

N87-15729# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
THEORY OF NON-FIRST NORMAN FORM RELATIONAL DATABASES Ph.D. Thesis

Mark A. Roth 1986 270 p
(AD-A171285; AFIT/CI/NR-86-120D) Avail: NTIS HC A12/MF A01 CSCL 09/2

One of the primary assumptions used in the relational model is that all relations must be in first normal form; that is, all values must be non-decomposable units. This assumption unduly constrains our ability to model data, especially for the non-traditional applications which are taxing our current database systems. This research extends relational database theory by relaxing the assumption that all relations in the database must be in first normal form. Relations containing attributes which may be atomic-valued or relation-valued are said to be in non-first normal form (non-1NF). In this context, we develop a non-1NF model and an extended formal query language based on the relational calculus, and prove its equivalence to a relational algebra extended with nest and unnest operators to deal with non-1NF relations. We define a property which non-1NF relations should satisfy, called partitioned normal form (PNF), and develop a set of extended algebra operators to manipulate non-1NF relations and maintain the PNF property. Our model and the extended operators are then further extended to deal with null values and empty nested relations. We present a user-oriented non-1NF query language, called SQL/NF, which is based on the SQL commercial database language and a proposed relational database language standard. GRA

N87-15730# Naval Postgraduate School, Monterey, Calif.
DESIGN OF A GRAPHICS USER INTERFACE FOR A DATABASE MANAGEMENT SYSTEM M.S. Thesis
Jerry K. Adcock Jun. 1986 168 p
(AD-A171393) Avail: NTIS HC A08/MF A01 CSCL 09/2

This thesis presents a solution to the problems associated with database management systems. User needs are discussed with a methodology to meet those needs. It is shown that no current system exists which can satisfy all requirements, so a new system or interface must emerge. The reminder of the thesis presents the design of such a system, called Graphics Language for Accessing a Database (GLAD). The Hierarchical Input Process Output (HIPO) System is used for design representation.
Author (GRA)

N87-15731# Massachusetts Inst. of Tech., Cambridge. Lab. for Computer Science.
NONSEQUENTIAL COMPUTATION AND LAWS OF NATURE Interim Report
Paul M. Vitanyi May 1986 22 p
(Contracts NOOO14-83-K-0125; N00014-85-K-0168; DAAG29-84-K-0058; Grant NSF DCR-83-02391)
(AD-A171505; MIT/LCS/TM-306) Avail: NTIS HC A02/MF A01 CSCL 09/2

Traditionally, computational complexity theory deals with sequential computations. In the computational models the underlying physics is hardly accounted for. This attitude has persisted in common models for parallel computations. Wrongly, as we shall argue, since the laws of physics intrude forcefully when we want to obtain realistic estimates of the performance of parallel or distributed algorithms. First, we shall explain why it is reasonable to abstract away from the physical details in sequential computations. Second, we show why certain common approaches in the theory of parallel complexity do not give useful information about the actual complexity of the parallel computation. Third, we give some examples of the interplay between physical considerations and actual complexity of distributed computations. Author (GRA)

N87-15732# Massachusetts Inst. of Tech., Cambridge. Lab. for Computer Science.
THE POWER OF THE QUEUE Interim Research Report
Ming Li, Luc Longpre, and Paul M. Vitanyi Apr. 1986 22 p
(Contract N00014-83-K-0125)
(AD-A171536; MIT/LCS/TM-303) Avail: NTIS HC A02/MF A01 CSCL 09/2

Queues, stacks (pushdown stores), and tapes are storage models which have direct applications in compiler design and the general design of algorithms. Whereas stacks (pushdown store or last-in-first-out storage) have been thoroughly investigated and are well understood, this is much less the case for queues (first-in-first-out storage). This paper contains a comprehensive study comparing queues to stacks and tapes. We address off-line machines with a one-way input, both deterministic and nondeterministic. The techniques rely on algorithmic information theory (Kolmogorov Complexity). Author (GRA)

N87-15733# Massachusetts Inst. of Tech., Cambridge. Lab. for Computer Science.
TIGHT BOUNDS FOR MINIMAX GRID MATCHING, WITH APPLICATIONS TO THE AVERAGE CASE ANALYSIS OF ALGORITHMS Interim Research Report
Tom Leighton and Peter Shor May 1986 31 p
(Contract NC0014-80-C-0326; Grants AF-AFOSR-0326-82; AF-AFOSR-0078-86)
(AD-A171552; MIT/LCS/TM-298) Avail: NTIS HC A03/MF A01 CSCL 12/2

The minimax grid matching problem is a fundamental combinatorial problem associated with the average case analysis of algorithms. The problem has arisen in a number of interesting and seemingly unrelated areas, including wafer-scale integration of systolic arrays, two-dimensional discrepancy problems, and testing pseudorandom number generators. However, the minimax grid matching problem is best known for its application to the maximum up-right matching problem. The latter was originally defined by Karp, Luby and Marchetti-Spaccamela in association with algorithms for 2-dimensional bin packing. More recently, the up-right matching problem has arisen in the average case analysis of on-line algorithms for 1-dimensional bin packing and dynamic allocation. This paper solves both the minimax grid matching problem and the maximum up-right matching problem. As a direct result, we obtain tight upper bounds on the average case behavior of the best algorithms known for 2-dimensional bin packing, 1-dimensional on-line packing and on-line dynamic allocation. The results also solve a long-open question in mathematical statistics. GRA

N87-15734# Battelle Columbus Labs., Washington, D. C.
DEFENSE MAPPING AGENCY ADVANCED RASTER-TO-VECTOR BENCHMARK TESTING Technical Report, Feb. - Jun. 1986
David D. Selden Jun. 1986 76 p
(Contract DAAG29-81-D-0100)
(AD-A171575; ETL-0420) Avail: NTIS HC A05/MF A01 CSCL 08/2

A methodology was developed for testing and evaluation of automated cartographic editing functions provided by cartographic data capture systems. Editing functions include gap closure, spike removal, snow removal, node snapping, centerline adjustment, etc. These functions are often implemented in three modes; automatic, computer-assisted and manual. The Battelle benchmark testing method focuses on automated editing. The testing and evaluation method consists of a single analog (film positive) edit test sheet and a series of test procedures. The edit test sheet portrays a column of cartographic patterns with anomalous versions of these cartographic geometries arrayed in rows to their right. Different lineweights and pattern orientations are also utilized. The full range of editing functions are applied to the data to test for rates of success and sensitivity to geometry, lineweight and orientation.
GRA

N87-15735# Sandia National Labs., Albuquerque, N. Mex.
GENESIS FINITE ELEMENT MESH FILE FORMAT
L. M. Taylor, D. P. Flanagan, and W. C. Mills-Curran May 1986 23 p
(Contract DE-AC04-76DP-00789)
(DE86-012740; SAND-86-0910) Avail: NTIS HC A02/MF A01

A new finite element mesh file format which provides a neutral interface from a mesh generation program to a finite element analysis program is described. The file format has been constructed to allow for multiple element types and flexible definition of boundary conditions. It provides for arbitrary element connectivity

and attributes, so that continuum and structural elements can easily be accommodated in the same model. Element side boundary conditions as well as nodal point boundary conditions are supported. The file format is applicable to finite element models in any n-dimensional space. Both bandwidth and wavefront optimization schemes can be accommodated with the GENESIS file format. DOE

N87-15736# Argonne National Lab., Ill.
APPROACHES TO OPTIMIZATION/SIMULATION PROBLEMS
M. Minkoff May 1986 16 p
(Contract W-31-109-eng-38)
(DE86-012758; ANL/MCS-TM-75) Avail: NTIS HC A02/MF A01

Often in conducting a computer simulation a scientist or engineer has a criterion that the model should fit. This criterion can take the form of fitting experimental data or determining an extremum of a general optimization function. While such problems can be attacked via parameter sweep techniques, they can be dealt with more efficiently by using numerical optimization methods. To combine optimization and simulation software efficiently and robustly, the user needs to be aware of the mathematical and software interface of these problems. In this paper we study some optimization/simulation problems and develop general approaches to formulating and solving such problems. DOE

62 COMPUTER SYSTEMS

Includes computer networks and special application computer systems.

N87-15737# Drexel Univ., Philadelphia, Pa. Dept. of Electrical and Computer Engineering.
COMPUTER FACILITIES FOR HIGH-SPEED DATA ACQUISITION, SIGNAL PROCESSING AND LARGE SCALE SYSTEM SIMULATION Final Report, 15 Dec. 1984 - 14 Apr. 1986
Nihat M. Bilgutay 25 Jun. 1986 28 p
(Grant AF-AFOSR-0056-85)
(AD-A170935; AFOSR-86-0507TR) Avail: NTIS HC A03/MF A01 CSCL 14/2

This equipment grant was issued under the DOD University Research Instrumentation Program for the purpose of upgrading the research instrumentation at Drexel University, Electrical and Computer Engineering Department, in order to improve the exiting facilities to better support present and future research having relevance to the National Defense Goals. In accordance with the guidelines of the grant, the funds have been expended to fulfill the stated goals of the grant. GRA

N87-15738# Massachusetts Inst. of Tech., Cambridge. Lab. for Computer Science.
RANDOMIZED ROUTING ON FAT TREES Interim Research Report
Ronald I. Greenberg and Charles E. Leiserson May 1986 27 p
(Contract N00014-80-C-0622)
(AD-A171546; MIT/LCS/TM-307) Avail: NTIS HC A03/MF A01 CSCL 09/2

Fat-trees are a class of routing networks for hardware-efficient parallel computation. This paper presents a randomized algorithm for routing messages on a fat-tree. The quality of the algorithm is measured in terms of the load factor of a set of messages to be routed, which is a lower bound on the time required to deliver the messages. This document shows that if a set of messages has load factor lambda on a fat-tree with n processors, the number of delivery cycles (routing attempts) that the algorithm requires is O(lambda + lg n lg lg n) with probability 1-O(1/n). The best previous bound was O(lambda lg n) for the off-line problem where switch settings can be determined in advance. In a VLSI-like model where hardware cost is equated with physical volume, the routing algorithm demonstrates that fat-trees are universal routing networks in the sense that any routing network can be efficiently simulated by a fat-tree of comparable hardware cost. GRA

N87-15739# Rochester Univ., N. Y. Dept. of Computer Science.
A PROGRAMMING ENVIRONMENT FOR PARALLEL VISION ALGORITHMS Annual Report, Feb. 1985 - Feb. 1986
Christopher Brown Aug. 1986 25 p
(Contract DACA76-85-C-0001)
(AD-A171561; ETL-0433) Avail: NTIS HC A02/MF A01 CSCL 09/2

During the first year of the award period, the Computer Science Department of the University of Rochester has pursued three main lines of work: systems support algorithms, Butterfly programming environment, and vision applications. Today's multiprocessor computer architectures are not efficiently programmed or even conceptualized with standard computer languages, and their operating systems and debugging tools are also challengingly different. The University of Rochester is doing work in the area of tools for controlling large-grain parallelism, as one finds in a distributed multiprocessor application like the Autonomous Land Vehicle, or in tightly coupled processors like the Hypercube or the Butterfly Parallel Processor. Author (GRA)

N87-15740# Massachusetts Inst. of Tech., Cambridge. Lab. for Computer Science.
DISTRIBUTED CONTROL IN COMPUTER NETWORKS AND CROSS-SECTIONS OF COLORED MULTIDIMENSIONAL BODIES Interim Research Report
Evangelos Kranakis and Paul M. Vitanyi Apr. 1986 19 p
(Contracts N00014-83-K-0125; DAAG29-84-K-0058)
(AD-A172224; MIT/LCS/TM-304) Avail: NTIS HC A02/MF A01 CSCL 09/2

The number of messages to match a pair of processes in a multiprocessor network with mobile processes is a measure for the cost of setting up temporary communication between processes. The authors establish lower bounds on the average number of point-to-point transmissions between any pair of nodes in the context. The present analysis allows for the possibility of multiple transmissions (as opposed to a single one) between any two nodes, and also for the possibility of multiple queries (as opposed to the two, i.e., post and a single query considered before). Applications of the results include lower bounds on the number of messages for distributed s-matching, that is, matching a group of s processes, and distributed s-mutual exclusion, that is, s-1 processes may enter a critical section simultaneously, but s processes may not, for s greater than or = 2. The idea of the proof of the combinatorial result needed for this analysis is further extended to obtain a lower bound on the average number of colors occurring in random cross-sections of colored, multidimensional bodies in terms of the total (multidimensional) volume of each color in the whole body. Author (GRA)

N87-15250# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany).
COMPUTER NETWORKING
G. Fischer *In its* Colloquium about Joint Projects within the DFVLR/ISRO Cooperation Jul. 1986 p 121-130 (For primary document see N87-15240 07-12)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne, West Germany DM 46

63 CYBERNETICS

Includes feedback and control theory, artificial intelligence, robotics and expert systems.

For related information see also *54 Man/System Technology and Life Support.*

N87-15741# Titan Systems, Inc., La Jolla, Calif.
ARTIFICIAL INTELLIGENCE THROUGH EVOLUTIONARY PROGRAMMING: PREDICTION AND IDENTIFICATION Interim Report, Feb. - Apr. 1986
Lawrence J. Fogel and David Fogel Aug. 1986 193 p Sponsored

by ARMY
(AD-A171544; ARI-RN-86-86) Avail: NTIS HC A09/MF A01 CSCL 06/4

This report examines the manner by which evolutionary programming treats an arbitrary prediction problem. Additional experiments were conducted to clarify uncertainties given increased machine size and the cost/benefit of retaining offspring programs, the impact of noise on the predictive capability of the evolutionary process, and the efficacy of crossover as a mechanism for improving simulated evolution. It was also found that some difficult combinatorial problems such as the classic Traveling Salesman Problem can be addressed through less complex logics.
Author (GRA)

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N87-15742*# Simon Fraser Univ., Burnaby (British Columbia). Dept. of Mathematics and Statistics.
SPACE MATHEMATICS: A RESOURCE FOR SECONDARY SCHOOL TEACHERS
Bernice Kastner Sep. 1985 179 p Sponsored by NASA
(NASA-EP-175; NAS 1.19:175) Avail: NTIS HC A09/MF A01 CSCL 12A

A collection of mathematical problems related to NASA space science projects is presented. In developing the examples and problems, attention was given to preserving the authenticity and significance of the original setting while keeping the level of mathematics within the secondary school curriculum. Computation and measurement, algebra, geometry, probability and statistics, exponential and logarithmic functions, trigonometry, matrix algebra, conic sections, and calculus are among the areas addressed.
M.G.

N87-15743*# Massachusetts Inst. of Tech., Cambridge.
VECTOR IMAGE METHOD FOR THE DERIVATION OF ELASTOSTATIC SOLUTIONS FOR POINT SOURCES IN A PLANE LAYERED MEDIUM. PART 1: DERIVATION AND SIMPLE EXAMPLES
Nabil Fares and Victor C. Li Nov. 1986 35 p
(Grant NAG5-740)
(NASA-CR-180062; NAS 1.26:180062) Avail: NTIS HC A03/MF A01 CSCL 12A

An image method algorithm is presented for the derivation of elastostatic solutions for point sources in bonded halfspaces assuming the infinite space point source is known. Specific cases were worked out and shown to coincide with well known solutions in the literature.
Author

N87-15744*# Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
IMAGE METHOD FOR THE DERIVATION OF POINT SOURCES IN ELASTOSTATIC PROBLEMS WITH PLANE INTERFACES
Nabil Fares and Victor C. Li Jul. 1986 67 p
(Grant NAG5-740)
(NASA-CR-180060; NAS 1.26:180060; RR-R86-19) Avail: NTIS HC A04/MF A01 CSCL 12A

An image method algorithm is presented for the derivation of point sources of elastostatics in multilayered media assuming the infinite space point source is known. Specific cases were worked out and shown to coincide with well known solutions in the literature.
Author

N87-15745*# Flow Analysis, Inc., Tullahoma, Tenn.
GRID GENERATION FOR TURBOMACHINERY PROBLEMS Interim Report, Dec. 1985 - Oct. 1986
J. Steinhoff and K. C. Reddy Nov. 1986 35 p Prepared in cooperation with Reddy and Associates, Tullahoma, Tenn.
(Contract NAS8-36487)
(NASA-CR-178988; NAS 1.26:178988) Avail: NTIS HC A03/MF A01 CSCL 12A

The development of a computer code to generate numerical grids for complex internal flow systems such as the fluid flow inside the space shuttle main engine is outlined. The blending technique for generating a grid for stator-rotor combination at a particular radial section is examined. The computer programs which generate these grids are listed in the Appendices. These codes are capable of generating grids at different cross sections and thus providng three dimensional stator-rotor grids for the turbomachinery of the space shuttle main engine.
B.G.

N87-15746# Florida State Univ., Tallahassee. Dept. of Statistics.
LARGE DEVIATION LOCAL LIMIT THEOREMS FOR RANDOM VECTORS
Narasinga R. Chaganty and Jayaram Sethuraman Jul. 1986 19 p
(Contract DAAL03-86-K-0094)
(AD-A171176; FSU-STATISTICS-M736; TR-D-92-ARO;
ARO-23699.3-MA) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper presents a survey of large deviation local limit theorems for random vectors. The authors then establish a more extensive large deviation local limit theorem that requires somewhat weaker conditions even in the special cases proved earlier.
Author (GRA)

N87-15747# Wisconsin Univ., Madison. Mathematics Research Center.
INITIAL-BOUNDARY VALUE PROBLEMS FOR LINEAR HYPERBOLIC SYSTEMS
Robert L. Higdon (Oregon State Univ., Corvallis.) Jun. 1986 43 p Reprinted from SIAM Review, v. 28, no. 2, Jun. 1986 p 177-217
(Contract DAAG29-80-C-0041; Grant NSF MCS-79-27062)
(AD-A171527; ARO-16415.461-MA) Avail: NTIS HC A03/MF A01 CSCL 12/1

We discuss and interpret a theory developed by Kreiss and others for studying the suitability of boundary conditions for linear hyperbolic systems of partial differential equations. The existing theory is extremely technical. The present discussion is based on the characteristic variety of the system. The concept of characteristic variety leads to (1) a physical interpretation of the theory in terms of wave propagation, and (2) a physical and geometrical method for visualizing the algebraic structure of the system. The great complexity of the theory is caused by certain aspects of this structure. We also point out connections between the above work and a corresponding theory regarding the stability of finite difference approximations.
GRA

N87-15748# Columbia Univ., New York. Dept. of Mathematics.
NONLINEAR PARTIAL DIFFERENTIAL EQUATIONS AND RELATED PROBLEMS OF PADE APPROXIMATIONS Final Report, 30 Jun. 1984 - 30 Sep. 1985
D. V. Chudnovsky and G. V. Chudnovsky 30 Sep. 1985 8 p
(Grant AF-AFOSR-0190-81)
(AD-A172253; AFOSR-86-0654TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The focus of the authors' work is the understanding and possibly explicit mathematical solution of the physically realistic classical and quantum models of field theories in dimensions one to four. They aim at the description of hidden symmetries and analytic structures of the solutions of various physical systems in dimensions one-four described by systems of nonlinear p.d.e. in cases when a system is suspected of being completely integrable, or at the investigation of obstructions to complete integrability. We continued and expanded our earlier studies of the structure of infinite-dimensional Lie algebras generated by Baecklund transformations and the geometric interpretation of the structure of S-matrices, applied to the extension of the Bethe Ansatz determining the solutions of completely integrable quantum systems to three- and four-dimensional systems. Very little is currently known in these cases, and there arise new multidimensional generalizations of factorization equations of S-matrices that have to be solved. A totally new area for mathematical studies has been opened by

recent progress in the physics of superstrings, where we hope to apply our methods of multi-particle and multi-string interactions, and where the use of methods from algebraic topology and theta functions (some of which were introduced by us in lower-dimensional cases earlier) seems very promising. GRA

N87-15749# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
FEASIBILITY AND COMPARISON INVESTIGATION OF THE USE OF THE FAST FOURIER TRANSFORM AND FINITE DIFFERENCE METHOD FOR NUMERICAL SOLUTION OF BOUNDARY VALUE PROBLEMS M.S. Thesis
Todd R. Jones Mar. 1986 82 p
(AD-A172719; AFIT/GNE/ENP/86M-8) Avail: NTIS HC A05/MF A01 CSCL 12/1

This thesis determined the feasibility of using Fast Fourier Transforms (FFT) to solve Boundary Value Problems (BVP) and then compare the results to those of the Finite Difference Method (FDM). Variations of Poisson's one and two dimensional equations were used as a vehicle to develop the FFT method. For the one dimensional BVP, both homogeneous and non-homogeneous Dirichlet boundary conditions were considered. In the one dimensional BVP the inhomogeneous function, F(x), was also varied. The two dimensional BVP, only one inhomogeneous function, F(x,y), and homogeneous boundary conditions were used. The one dimensional model was used as a basis for developing the two dimensional model. The analytical solution of each problem was compared to the numerical solution of the FDM and the FFt method at varying mesh sizes. The computational time of the FDM and the FFT method were also compared. The results indicate that the FFT is extremely efficient in the two dimensional BVP because of the computer storage space required and the computational time needed to solve the FFTs. The accuracy of the FFT compares favorably to the FDM and, as the mesh size decreases, becomes more accurate than the FDM. GRA

N87-15750# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Computer Science.
DIAGONALIZATION METHODS IN A POLYNOMIAL SETTING
Leen Torenvliet and Peter vanEmdeBoas Mar. 1986 20 p Presented at Structure in Complexity Theory Conference, Berkeley, Calif., 2-5 Jun. 1985
(FVI-86-10; B8669247; ETN-86-98667) Avail: NTIS HC A02/MF A01

Diagonalization methods for the construction of oracle sets relative to which complexity classes in the P-Time Hierarchy are separated structurally are reviewed. The methods are compared on the basis of inherent properties. A characterization of these properties leads to a taxonomy for the diagonalization methods. ESA

N87-15751# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
SOME ASYMPTOTIC PROPERTIES OF MULTIVARIABLE MODELS IDENTIFIED BY EQUATION ERROR TECHNIQUES
P. M. J. vandenHof and P. H. M. Janssen Nov. 1985 31 p
(EUT-85-E-153; ISBN-90-6144-153-6; ISSN-0167-9708; ETN-86-98709) Avail: NTIS HC A03/MF A01

Asymptotic results for the approximate modeling of multivariable systems by equation error methods are established, applying least squares and instrumental variable techniques. The methods are analyzed for situations where the system at hand is not necessarily contained in the chosen model set. The results are obtained for a very general class of linear models, with linearity in the parameters. This class of models covers all commonly used matrix fraction description (MFD)-forms and ARMAX forms. Under the condition of white input noise, it is shown that the Markov parameters of the system are estimated asymptotically unbiased over an interval around t=0. Results for this match between Markov parameters of the system and the model are specified for various parametrizations in MFD form and in ARMAX form. It is shown that for causal systems the identified model is asymptotically causal, notwithstanding the fact that the applied model set might contain noncausal models. ESA

N87-15343*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A GENERALIZED ALGORITHM TO DESIGN FINITE FIELD NORMAL BASIS MULTIPLIERS
C. C. Wang *In its* The Telecommunications and Data Acquisition Report 15 Nov. 1986 p 125-139 (For primary document see N87-15329 07-32)
Avail: NTIS HC A14/MF A01 CSCL 12A

N87-15756# Osaka Univ. (Japan). Dept. of Applied Physics.
ITERATIVE METHODS AND PRECONDITIONING FOR SOLVING LARGE SYSTEM OF LINEAR EQUATIONS
Tsuyako Miyakoda *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 233-244 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

N87-15795# Ecole Polytechnique, Palaiseau (France). Groupe de Physique Theorique.
KINETIC EQUATION FOR HAMILTONIAN SYSTEMS INTEGRABLE IN THE MEAN FIELD APPROXIMATION
J. F. Luciani and R. Pellat *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 17-20 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20% others)

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N87-15752# Royal Aircraft Establishment, Farnborough (England).
THE CHARACTERISTICS OF THE SECOND-ORDER TARGET MODEL
D. J. Salmond Aug. 1985 50 p
(RAE-TR-85071; RAE-AW-18; BR99021; ETN-86-98375) Avail: NTIS Avail: NTIS HC A03/MF A01

Statistics of the trajectories generated by a linear second-order target model used in tracking filters are presented, and using these statistics the distribution of the change in target heading over any time period is derived. This distribution is the basis of a technique for choosing the model maneuver parameter suitable for a given class of targets. Design curves for this technique are supplied. ESA

N87-15753# Stanford Univ., Calif. Dept. of Statistics.
THE STATIONARY AUTOGRESSIVE MODEL
T. W. Anderson Jul. 1986 28 p
(Contract DAAG29-85-K-0239)
(AD-A171416; TR-17; ARO-22729.2-MA) Avail: NTIS HC A03/MF A01 CSCL 12/1

There are several ways of developing the autoregressive stochastic process as a finite-parameter model for time series analysis. This paper obtains the properties of the autoregressive process from a stationary stochastic process that satisfies the simple condition that a linear combination of current and past elements of the process is independent of (or alternatively uncorrelated with) all earlier elements of the process. This approach provides a coherent, clear, and rigorous exposition of the autoregressive model. The stationarity and independence imply that the roots of the associated polynomial equation are less than 1 in absolute value. The existence of the moving average representation is deduced and its form for distinct roots. The Yule-Walker equations, which are derived, determine the autocovariance sequence. Another set of parameters consists of the variance of the process and the partial autocorrelation sequence. GRA

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

No abstracts in this category.

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

No abstracts in this category.

70 PHYSICS (GENERAL)

For precision time and time interval (PTTI) see *35 Instrumentation and Photography;* for geophysics, astrophysics or solar physics see *46 Geophysics, 90 Astrophysics,* or *92 Solar Physics.*

N87-15754# Osaka Univ. (Japan). Faculty of Engineering.
TECHNOLOGY REPORTS OF THE OSAKA UNIVERSITY, VOLUME 36, NOS. 1844-1864
Oct. 1986 181 p
(ISSN-0030-6177) Avail: NTIS HC A09/MF A01

Topics addressed include: mathematics and physics; metallurgy and welding engineering; electrical and electronic engineering; mechanical engineering; civil, architectural, and environmental engineering; naval architecture; chemistry; and biology. For individual titles, see N87-15755 through N87-15772.

N87-15755# Osaka Univ. (Japan). Dept. of Applied Physics.
STATISTICAL MECHANICS OF ONE-DIMENSIONAL SYSTEMS. 4: GENERALIZATION OF THE HARD-CORE REPULSION IN MULTICOMPONENT GASES c34
Kazuyosi Ikeda *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 221-232 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

The hard-core repulsion (with uniform diameter) is generalized in the models of one-dimensional multicomponent gases. The thermodynamic functions for both models with this generalization of the hard-core repulsion are rigorously calculated, by assuming the existence of a repulsion between the hard core of a particle and the hard walls of the vessel. As a result of this generalization, sigma (diameter) is replaced by the average diameter of the hard cores of all the particles, and some formulae appearing in several phenomena and properties of one-dimensional multicomponent systems are modified. Author

N87-15756# Osaka Univ. (Japan). Dept. of Applied Physics.
ITERATIVE METHODS AND PRECONDITIONING FOR SOLVING LARGE SYSTEM OF LINEAR EQUATIONS c64
Tsuyako Miyakoda *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 233-244 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

Preconditioning for the conjugate gradient method is discussed to solve systems of linear equations. Appending to the usual preconditioning, e.g., the incomplete Cholesky factorization of SSOR type, a mixed type method is proposed. The method, which is more simple than the incomplete factorization, is tested by some numerical examples arising from the elliptic boundary value problems. Author

N87-15757# Osaka Univ. (Japan). Dept. of Applied Physics.
APPLICATION OF BARLOW-WU SYSTEMS TO SAFETY MONITORING SYSTEMS c31
Hiroyuki Hagihara, Makoto Sakurai, Fumio Ohi, and Toshio Nishida *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 245-248 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

The state spaces of Barlow-Wu systems are extended to totally ordered sets and applied to safety monitoring systems. A Barlow-Wu system corresponds to a coherent two-stage system. It is shown that the k-out-of-n Barlow-Wu system is one of the systems which minimize the expected damage cost when the components in the systems are stochastically identical. Author

N87-15758# Osaka Univ. (Japan). Dept. of Welding Engineering.
ON CAVITATION AND RESIDUAL CREEP LIFE c39
Pertti Auerkari, Kunihiko Satoh, and Masao Toyoda *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 259-265 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

The degree of cavitation in uniaxial creep was treated as a function of strain. Such a relationship yields simple expression of residual creep life fraction for which no measurements of strain, temperature, or stress are needed. Moreover this expression is closely linked with maximum strain, estimates for relative creep ductility and critical level of cavitation are required. Author

N87-15759# Osaka Univ. (Japan). Dept. of Welding Engineering.
REAL TIME OPTIMIZATION OF THINPLATE TIG ARC WELDING c37
Takayoshi Ohji, Kimiyuki Nishiguchi, and Yasuhiko Yoshida *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 267-273 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

A method of optimization of process parameters in arc welding is discussed. In the method, a mathematical model for the molten pool under welding is applied to estimate the optimum process parameters, and the temperature in welding detected by infrared sensors is used to identify the model. The computer system developed makes a real time optimization of the process parameters possible for a thin plate TIG arc welding. Author

N87-15760# Osaka Univ. (Japan). Dept. of Welding Engineering.
IMPROVEMENT OF IMAGE QUALITY OF RADIOGRAPH BY MEANS OF NARROW AREA RADIATION METHOD c74
Tomio Senda, Kazuo Hirayama, and Keiji Yokoyama *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 275-284 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

In order to acknowledge as small defects as possible on the radiograph, it is necessary to increase the density difference on the radiograph, namely, the radiographic contrast between defects and the sound metal. Various factors are reviewed from different angles which affect the amount of scattered radiation and makes the comprehensive study on the narrow area radiation method which is effective in reducing the amount of scattered radiation, keeping in mind that the radiographic contrast is enhanced by reducing the amount of scattered radiation. Author

N87-15761# Osaka Univ. (Japan). Dept. of Electrical Engineering.
AN ANALYSIS METHOD OF STRONGLY CONNECTED STRUCTURE BASED ON FUNDAMENTAL CYCLES c39
Tatsuya Masuda, Koichi Munakata, and Katsuhiko Fujii *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 285-293 (For primary document see

N87-15754 07-70)
Avail: NTIS HC A09/MF A01

A strongly connected structure, in which many cycles exist and get entangled in each other, is one of the most difficult system structures that can not be fully analyzed. An effective structural analysis method for a strongly connected structure is presented. This method is outlined as follows. Firstly, all of the fundamental cycles which construct the skeleton of strongly connected structure are picked out from the cycle set. Secondly, new order relations among these fundamental cycles are defined based on two concepts, i.e., interval order and pseudo-interval order. The ordering results are shown in the forms of two hierarchical digraphs. These digraphs give a great deal of useful structural information buried in the strongly connected structure. The effectiveness of this method is demonstrated by applying it to two examples. Author

N87-15762# Osaka Univ. (Japan). Lab. for Applied Superconductivity.
APPLICATION OF SUPERCONDUCTING MAGNET ENERGY STORAGE TO POWER SYSTEM STABILIZING CONTROL c33
Yasunori Mitani, Kiichiro Tsuji, and Yoshishige Murakami *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 305-315 Submitted for publication (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

The application of Superconducting Magnet Energy Storage (SMES) to the stabilizing control of power systems with a long distance bulk power transmission line and with longitudinal interconnected structure is presented. Control schemes for stabilization using an SMES is proposed and the effective locations of SMES in these power systems are discussed in detail. Results of eigenvalue analysis and computer simulations demonstrate the significant effect of the control by SMES on power system stabilization. From the results of simulations necessary capacities of SMES for stabilization are evaluated. Author

N87-15763# Osaka Univ. (Japan). Dept. of Electrical Engineering.
EFFECT OF LIGHT-SOAKING ON ELECTRONIC PROPERTIES OF GLOW-DISCHARGED HYDROGENATED AMORPHOUS SILICON c33
Shunsuke Nagata, Kazuhiro Shirakawa, and Junji Shirafuji *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 317-322 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

Metastable light-induced changes in as-deposited and gamma-ray irradiated hydrogenated amorphous silicon were studied by means of transient and steady-state photoconductivity and electron spin resonance (ESR) measurements. It is first found that the Fermi level is clamped after irradiation with a low dose of gamma-rays and does not move any more by subsequent intense prolonged light illumination. The ESR spin density in gamma-ray irradiated samples with the clamped Fermi level is found to increase by light illumination; this clarifies dangling bond creation in a-Si:H by light-soaking. Time-of-flight measurement confirms a remarkable degradation only of carrier lifetime by light-soaking without any change in the electron mobility. Gamma-ray irradiated samples with poor photoconductivity due to higher density of dangling bonds show larger increase in dangling bond density by light-soaking than that in unirradiated samples of high photoconductivity due to lower dangling bond density, in contrast with bond-breaking model in which a self-limiting process is considered. Author

N87-15764# Osaka Univ. (Japan). Dept. of Electrical Engineering.
ELECTRICAL CONDUCTIVITY AND CARRIER MOBILITY IN POLYPHENYLACETYLENE AND POLYCHLOROPHENYLACETYLENE AND THEIR DOPING EFFECT c33
Hal Bon Gu, Shigenori Hayashi, Ryu-ichi Sugimoto, and Katsumi Yoshino *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 323-328 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

Electrical and optical properties of various substituted polyacetylene are studied. The electrical conductivity, photoconductivity, and carrier mobility are dependent remarkably on the substituted atoms or molecular units, which are discussed in terms of the influence on the conjugated pi-electron system of polymer main chains. The doping effect is also influenced by the substitution. Author

N87-15765# Osaka Univ. (Japan). Dept. of Electrical Engineering.
PHOTOINDUCED EFFECTS IN POLYTHIOPHENE FILM c27
Taketora Shiraishi, Keiichi Kaneto, and Katsumi Yoshino *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 329-334 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

Photoinduced electron spin resonance (ESR) and conductivity of a conducting polymer, polythiophene film were studied. The ESR spin density and linewidth in the slightly doped film decrease upon illumination by the infrared light, suggesting that polarons with spins interact with photoexcited electrons from the polaronic state and/or valence band. The photocurrent spectrum of an undoped film indicates the generation of photocarriers by the interband excitation. In doped films, the photoresponse is observed at an infrared region too, originating from the excitation of gap states. Variations of absorption spectra by reducing temperature in doped films are also studied. Author

N87-15766# Osaka Univ. (Japan). Dept. of Electrical Engineering.
TRANSMISSION ELECTRON MICROSCOPE AND PHOTOLUMINESCENCE STUDIES OF ZnS CRYSTALLINE FILMS GROWN BY LOW-PRESSURE MOCVD c76
Yoichi Kawakami, Tsunemasa Taguchi, and Akio Hiraki *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 335-343 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

Epitaxial films of the not-deliberately-doped ZnS were grown on (100), (110), and (111) GaAs substrates by the low-pressure organometallic chemical vapor deposition technique using dimethylzinc and H2S gas as the source materials. Structured defect characteristics associated with the presence of stacking faults and twins were explored through 2 MeV transmission electron microscopy. Relatively high-quality ZnS film exhibits LO-phonon-replicated edge-emission band at about 3.67 eV at 4.2 K, suggesting an acceptor level at about 0.17 eV above the valence band. It is found that the substrate temperature and orientation have a marked effect on the quality and photoluminescence properties of heteroepitaxial films. Author

N87-15767# Osaka Univ. (Japan). Course of Electromagnetic Energy Engineering.
HARMONC CONVERSION OF GEKKO 12 HIGH-POWER Nd: GLASS LASER c36
Yoshio Hirose, Tadashi Kanabe, Masahiro Nakatsuka, and Chiyoe Yamanaka *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 345-351 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

The simulation and the experimental results of the second harmonic conversion with GEKKO XII 1.053 microns Nd:glass laser using monolithic KH2PO4(KDP) crystals are reported. An accurate KDP alignment method was developed using a repetitively Q-switched YAG laser in order to attain a high doubling efficiency. The doubling efficiency excess 80% was achieved. Simulation results of GEKKO XII third harmonic conversion system is also discussed. Author

N87-15768# Osaka Univ. (Japan). Course of Electromagnetic Energy Engineering.
COPPER VAPOR LASERS FOR ISOTOPE SEPARATION c36
Chihiro Yamanaka, Etsuo Fujiwara, Toshihiro Naka, Tetsuya

Takeda, Tatsuhiko Yamanaka, and Chiyoe Yamanaka *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 353-359 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

Copper vapor lasers for uranium isotope separation were investigated. The laser system is composed of an oscillator and an amplifier, the diameters of which are 28 and 50 mm, respectively. An inverter electric power supply which synchronizes the laser frequency is adopted to protect the thyratron switch from misfiring and to change the operating condition in a wide range. By this precaution the laser operation becomes quite stable and realizes a long term performance. The output power of the oscillator is 16 watt at 5 kHz operation with 20 mbar Ne gas and the wall temperature of 1540 C. The detailed characteristics of the laser system are presented. Author

N87-15769# Osaka Univ. (Japan). Course of Electromagnetic Energy Engineering.
DEVELOPMENT OF A SINGLE-MODE DYE LASER PUMPED BY A COPPER VAPOR LASER c36
Yasushi Arai, Hideaki Niki, Satoru Adachi, Tetsuya Takeda, Tatsuhiko Yamanaka, and Chiyoe Yamanaka *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 361-367 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

An efficient high power single mode dye laser was developed for a study of uranium enrichment. The oscillation and amplification properties were studied experimentally and theoretically. The obtained band width was narrower than 100 MHz. When rhodamine 6 G chloride was used, the average output power and efficiency of the oscillator-amplifier system were 300 mW and 5%, respectively, at 575 nm for the total copper vapor laser pumping power of 4 W. Author

N87-15770# Osaka Univ. (Japan). Dept. of Precision Engineering.
NON-REFERENCE ANALYSIS OF ROTATIONAL ACCURACY WITH NANOMETER RESOLUTION ON ULTRAPRECISION SPINDLE c35
Naoya Ikawa, Shoichi Shimada, Hideyuki Morooka, and Hitoshi Hirano *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 369-378 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

Based on a precise analysis of the so-called 3-point method as applied to the roundness meaurement, a method is proposed for evaluating the radial runout of the rotor in an air bearing (an air spindle). Under some conditions usually satisfied in air spindles, the information on the true runout of the rotor can be obtained by this method without using the reference such as the sphere or the cylinder the accuracy of which are certified. With the aide of the developed photoelectronic displacement sensor with 0.5 nm resolution and 40 micron working range, the runout of an air spindle is evaluated by the method proposed. The air spindle tested is shown to be operated within the rotational accuracy of 50 nm with the repeatibility of about 5 nm. Author

N87-15771# Osaka Univ. (Japan). Dept. of Environmental Engineering.
NATURAL CONVECTION OF STABLY STRATIFIED FLUID LAYER WITH UNIFORM HEATING FROM BELOW c34
Akira Yoshikawa, Katsuhito Yamaguchi, Yoshio Inoue, and Hwa Weon Lee *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 379-385 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

The natural convection of stably stratified fluid layer with uniform heating from below is investigated by means of both laboratory experiments and numerical analysis by two-equation turbulence model. The computed and experimental results are presented in terms of the development of mixed layer, vertical profile of horizontally averaged temperature, and height of the mixed layer as a function of time and initial temperature gradient, which appears to agree reasonably. It is necessary, however, in the future to measure the space distribution of velocity and temperature in more detail and to compare them with numerical computations. Author

N87-15772# Osaka Univ. (Japan). Dept. of Applied Chemistry.
EFFECTS OF PHOSPHORIC ACID ON THE LEAD-ACID BATTERY REACTIONS c44
Osamu Ikeda, Chiaki Iwakura, Hiroshi Yoneyama, and Hideo Tamura *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 387-396 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

The addition of a small amount of phosphoric acid to 5 M H2SO4 (commercial electrolyte of lead-acid batteries) results in various positive effects on the lead-acid battery reactions: (1) depression of the corrosion rate of the lead substrate through a preferential formation of alpha-PbO2 on the substrate surface; (2) retardation of hard sulfate formation or of deactivation of active materials; and (3) change in the crystal morphology of PbSO2 formed on the discharge of PbO2. Most of these effects results from chemisorption of phosphoric acid on PbSO4 crystals produced in the discharge process of PbO2. Author

N87-15773# Aerospace Corp., El Segundo, Calif. Chemistry and Physics Lab.
A RUBIDIUM CLOCK MODEL
Robert P. Frueholz and James C. Camparo 15 Jun. 1986 57 p (Contract FO4701-85-C-0086)
(AD-A171133; TR-0086(6945-05)-3; SD-TR-86-41) Avail: NTIS HC A04/MF A01 CSCL 14/2

A signal model for the rubidium (Rb) clock is developed, which combines feedback analysis of the clock's servo-control circuitry with the atomic physics required to describe the processes occurring within the Rb absorption cell. The model permits clock performance, in terms of Allan variance, to be predicted from a number of parameters. While building on prior studies of Rb standards, the model incorporates features which make it distinctive. All previous models of the Rb clock were limited to an analysis of the clock's short term performance, Allan variance averaging times of less than 10,000 sec. However, by including the effects of discharge lamp intensity fluctuations, which are transformed into output frequency variations via the light shift effect, clock performance can be predicted for averaging times greater than 10,000 sec. Furthermore, the model is the first which incorporates the influence of an optically thick Rb vapor along with the diffusion of optically pumped atoms to the walls of the absorption cell into the calculation of clock performance. In addition, the model has been developed in sufficient generality to permit its application to diode laser pumped clocks using other alkali metals. calculation of clock performance. In addition, the model has been developed in sufficient generality to permit its application to diode laser pumped clocks using other alkali metals. GRA

N87-15774# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
INVESTIGATION OF MAGNETOSTATIC SURFACE WAVES FOR ANISOTROPIC EFFECTS M.S. Thesis
Robert E. Floyd Jun. 1986 85 p
(AD-A172375; AFIT/GE/ENG/86J-1) Avail: NTIS HC A05/MF A01 CSCL 20/3

A unique test apparatus was designed in order to investigate the effect of launching magnetostatic surface waves at different angles on a yttrium-iron-garnet (YIG) single crystal film. Many characteristics of the Magnetostatic waves were measured, including amplitude, time delay, and beam steering. There was slight dependence of these characteristics on the launch angle. A second, more sensitive technique using the YIG films as delay lines in an oscillating circuit, was found to verify the influence of magnetocrystalline anisotropy on the magnetostatic surface wave. A calculated shift in frequency of the oscillator was found to be in agreement with previous calculations and measurements of anisotropic constants. In addition to these findings, an investigation

of the influence of a metallization spaced closely to the propagation path was performed due to its influence on the above measurements. This metallization altered the velocity of the magnetostatic wave and demonstrated, for the first time, the refraction of a magnetostatic wave. This technique may prove useful for instantaneous frequency selection in electronic countermeasure equipment. Author (GRA)

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution.*

N87-15775*# National Aeronautics and Space Administration, Washington, D.C.
EFFECT OF SONIC BOOM ON AVALANCHES. PREPARATION FOR FLIGHT OF A SUPERSONIC JET OVER THE LAVAY VALLEY
M. Schaffar, B. Carrie, and P. Amardeil Dec. 1986 37 p Transl. into ENGLISH of rept. ISL-13/72 Inst. Franco-Allemand de Recherches, St. Louis, France, 6 Jun. 1983 Original language document was announced as N73-21940 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-88535; NAS 1.15:88535; ISL-13/72) Avail: NTIS HC A03/MF A01 CSCL 20A

An experiment to determine the effect of sonic booms on the stability of the snow mantle in the Lavey Valley is proposed. It includes provisions for the aircraft trajectory, line of fucus, boom zone, as well as the determination of boom intensity levels for the whole valley. Author

N87-15776# Pennsylvania State Univ., State College. Applied Research Lab.
EFFECTS OF STRONG DIFFRACTION ON THE FOCUSING AND SCATTERING OF ACOUSTIC WAVES
T. B. Gabrielson, S. T. McDaniel, and D. W. Thomson Jun. 1986 164 p
(AD-A171220; TR-86-004) Avail: NTIS HC A08/MF A01 CSCL 20/1

In many wave propagation problems, diffraction is considered to be a second order effect that diffuses the sharp shadows and focal surfaces predicted by ray theory. However, if the frequency is low enough so that the wavelength is comparable to the size of the focusing region, structured fields of significant level can be found in classical shadows and smooth, featureless enhancement can replace the sharp, multiple convergences common at higher frequencies. This study examines the effects of strong diffraction on refractive focusing of acoustic waves. In addition, signal fluctuations caused by perturbations of the refractive index are considered where the spatial extent of a particular perturbation patch is comparable to the wavelength. Consequently, the perturbation mechanism is primarily diffractive also. GRA

N87-15777# Texas Univ., Austin. Applied Research Lab.
RESEARCH IN NONLINEAR ACOUSTICS Final Report, 1 Apr. 1975 - 31 Aug. 1984
David T. Blackstock 2 Jul. 1986 83 p
(Contract N00014-75-C-0867)
(AD-A172634; ARL-TR-86-19) Avail: NTIS HC A05/MF A01 CSCL 20/1

Research in nonlinear acoustics was carried out during the period 1 April 1975 - 31 August 1986. The general goal was to understand the behavior of sound waves of finite amplitude. Progress toward this goal was made by attacking specific problems in the following areas: (1) Theoretical work on periodic waves, including Burgers' equation and sound beams, (2) Tones, noise, and interaction--mainly experimental, including outdoor propagation of tones and noise, suppression of sound by sound, interaction of noise with a tone, and noncollinear interaction of two tones in a rectangular waveguide; (3) N waves and other transients, including development of a schlieren system, diffraction by a slit, propagation in a cylindrical tube, shock rise time, and propagation of a weak shock having a tail of arbitrary waveform; (4) Propagation in inhomgenous fluids, including values of B/A for sea water and nonlinear geometrical acoustics with applications to long range underwater propagation; (5) Nonlinear effects in air-filled porous materials; (6) Parametric receiving array; (7) Focused beam parametric transmitter; and (8) Miscellaneous topics. Work was also done on selected topics in linear acoustics, such as thermoacoustics and water-to-air sound transmission. GRA

N87-15778# National Bureau of Standards, Gaithersburg, Md.
ULTRASONIC MEASUREMENTS RESEARCH: IMPROVED ACOUSTIC EMISSION METHODS
F. R. Breckenridge, T. M. Proctor, M. Greenspan, and D. G. Eitzen Aug. 1986 13 p
(Contract N00014-86-F-0024)
(AD-A172726; Rept-86-SUM-ONR) Avail: NTIS HC A02/MF A01 CSCL 20/1

Developments on new transducers for high fidelity measurement of normal and tangential displacement are summarized. Improvements in calibration techniques are outlined. The transducer aperture effect is measured and compared to theories. GRA

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure, electron properties, and molecular spectra.

N87-15779# Georgia State Univ., Atlanta.
INVESTIGATIONS OF THE INTERACTIONS OF RADIATION WITH MATTER Final Report, Mar. 1983 - May 1986
Steven T. Manson 31 Jul. 1986 13 p
(Contract DAAG29-83-K-0054)
(AD-A171232; ARO-19944.18-PH) Avail: NTIS HC A02/MF A01 CSCL 20/8

Charged particle impact ionization of atoms and molecules is discussed, along with photoabsorption by excited states and ground state atoms, and properties of atomic ions. Relevance of this research to applications in radiation damage and protection, nuclear pumped and x-ray lasers, IR generation and detection, and atmospheric beam devices is pointed out. GRA

N87-15780# Cornell Univ., Ithaca, N.Y. Lab. of Atomic and Solid State Physics.
INELASTIC GAS-SURFACE SCATTERING. PART 2: RESULTS
Mark D. Stiles and John W. Wilkins 25 Aug. 1986 118 p
(Contract N00014-82-K-0576)
(AD-A171587; TR-27) Avail: NTIS HC A06/MF A01 CSCL 20/10

Helium and molecular hydrogen scattering from copper is calculated to examine general features of scattering for these systems, especially the quantum mechanics of the scattering process, both for the motion of the particle and the excitations of the lattice. These calculations use an interaction potential chosen to simplify the numerical calculation while retaining the essential physics of the interaction. The scattering calculations show that these approximations quantitatively reproduce experimental results. The scattering probabilities are shown to depend on details of the system like the well depth and the steepness of the potential and assumptions are made to simplify the interaction potential. H2 and D2 inelastic scattering and trapping probabilities show strong enhancement by selective adsorption resonances and overall changes in scattering intensities due to other more subtle effects of the rotational degrees of freedom. Temperature dependent HD scattering probabilities show the effect of inelastic scattering on rotationally inelastic scattering and selective adsorption resonances. GRA

N87-15781# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).

THE FIVE DEEPEST POTENTIAL HYPERSURFACES OF THE CH2(+) ION. DESCRIPTION BY CONTINUOUS FUNCTIONS ADAPTED TO INITIAL VALUES Thesis [DIE FUENF TIEFSTEN POTENTIALHYPERFLAECHEN DES CH2+: DARSTELLUNG KONTINUIERLICHE AN AB INITIO WERTE ANGEPASSTE FUNKTIONEN]

J. Reichmuth Feb. 1986 129 p In GERMAN
(MPIS-4/1986; ISSN-0436-1199; ETN-86-98225) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karisruhe, West Germany DM 28

A universal description of the potential energy of atomic systems was developed. The expression is a continuous fitting function of the three atomic distances assumed to be initially given. The function is flexible enough to describe complex structures of potential surfaces. It consists of the combination of a Diatomic In Molecules (DIM) model and a polynomial. The polynomial consists of powers of exponential or Gaussian functions of the atomic distances. The method was applied to the 5 deepest states of the CH2(+)ion; 1200 energy values could be described with an average deviation of 1 to 2 kcal/mol. The usefulness of the potential energy functions for dynamic calculations was demonstrated. The obtained potential energy functions allow a theoretical treatment of collision dynamics problems. ESA

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N87-15782*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

AN ASSESSMENT OF TRANSPORT COEFFICIENT APPROXIMATIONS USED IN GALACTIC HEAVY ION SHIELDING CALCULATIONS

Lawrence W. Townsend and John W. Wilson Dec. 1986 17 p
(NASA-TM-89054; NAS 1.15:89054) Avail: NTIS HC A02/MF A01 CSCL 20H

An energy-dependent, perturbation expansion solution for heavy ion transport in one dimension is used to perform depth-dose calculations for 670/MeV nucleon Ne-20 beams incident upon a thick water target. Comparisons of predictions obtained by using typical energy-independent approximations and those obtained with fully energy-dependent input parameters are made. It is found that the calculated doses are underestimated when the energy-independent input approximations are used. The major source of error, however, is the lack of charge and mass conservation in the Silberberg-Tsao fragmentation parameters. Author

N87-15783# RAND Corp., Santa Monica, Calif.

SOVIET RESEARCH ON THE TRANSPORT OF INTENSE RELATIVISTIC ELECTRON BEAMS THROUGH LOW-PRESSURE AIR Interim Report

Nikita Wells Aug. 1986 62 p
(Contract MDA903-85-C-0030)
(AD-A172274; RAND/R-3309-ARPA) Avail: NTIS HC A04/MF A01 CSCL 20/8

Soviet research on the propagation of intense relativistic electron beams (IREB) through air and gases has demonstrated the existence of several pressure ranges for possible efficient IREB propagation. The Soviets have recently paid specific attention to the low-pressure range from .000001 to .001 Torr. Theoretical analysis concentrated on the formation of a quasi-equilibrium beam and the derivation of an expression for its propagation through low-pressure gas, taking into account space-charge forces, self-focusing of the beam, and the effect of the beam's own magnetic field on its focusing properties. The analysis involved the determination of equilibrium-beam formation time, relaxation length, density distribution of plasma formed by the passage of the beam, and the effects of beam parameters upon this background plasma. Experimental investigation of the quasi-equilibrium beam demonstrated that it has a Bennett profile, determined the beam formation time, and showed that formation time decreases with increasing pressure and propagation length. For a 300 keV, 100 A beam, transverse beam temperature was found to be 0.5 keV near the beam focus, and 2 keV downstream of the focus. No dependence of beam front velocity upon propagation length had been observed. GRA

N87-15784# Japan Atomic Energy Research Inst., Tokyo.

CALCULATIONS OF HEAT DEPOSITION IN A TARGET SYSTEM BOMBARDED BY HIGH ENERGY CHARGED PARTICLES

Takahiko Nishida and Yasuaki Nakahara Sep. 1984 49 p In JAPANESE
(DE86-700263; JAERI-M-84-154) Avail: NTIS (US Sales Only) HC A03/MF A01

At the Japan Atomic Energy Research Institute (JAERI), with the use of the Monte Carlo code NMTC/JAERI and the analysis code NMTA, studies have been performed of the feasibility of an emerging new technology such as an accelerator nuclear fuel producer or a radioactive waste transmuter, which utilizes abundant neutrons emitted by the spallation and fission reactions in a proton accelerator target. New subroutines were added to the NMTA code calculating the total heat deposition and the spatial distribution of heat deposition density in a target. A new subroutine is provided also for estimating the mean excitation energy of recoiling residual nuclei after the particle evaporation ceased to occur. The NMTC/JAERI flow for a fission event was also modified. The processes that account for the heat producing energy in the range greater than 15 MeV are mainly (a) ionization loss by charged particles through transport and (b) the kinetic energy of recoil nuclei after intranuclear cascades and fissions. Preliminary calculations of the heat deposition are carried out for small bare targets of Pb, Nat. U and molten salts for some combinations of incident particle energy, beam radius, target material and size. The new computational routines are explained in detail and discussions are done on the calculated results. DOE

N87-15785# New Mexico Univ., Albuquerque. Inst. for Space Nuclear Power Studies.

TRANSACTIONS OF THE SYMPOSIA ON SPACE NUCLEAR POWER SYSTEMS: SUMMARIES

M. S. El-Genk, ed. and M. D. Hoover, ed. 1986 291 p Presented at the 3rd Symposium on Space Nuclear Power Systems, Albuquerque, N. Mex., 13 Jan. 1986
(Contracts W-7405-eng-36; DE-AC04-76DP-00789)
(DE86-005726; CONF-860102-Summs) Avail: NTIS HC A13/MF A01

These are the Transactions of the Symposia on Space Nuclear Power Systems, which took place in Albuquerque, N. Mexico, on 13 Jan. 1986. Separate abstracts were prepared for 103 papers in this report. DOE

N87-15326# Universite Catholique de Louvain (Belgium). Dept. de Thermodynamique et Turbomachines.

WHAT CAN WE LEARN FROM NUCLEAR ENGINEERING SAFETY?

Michel Giot *In* Von Karman Inst. for Fluid Dynamics Two Phase Flows in Major Technological Hazards, Volume 1 1986 20 p
(For primary document see N87-15321 07-31)
Avail: NTIS HC A17/MF A01

74 OPTICS

N87-15786*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

SELF-CLAMPING ARC LIGHT REFLECTOR FOR WELDING TORCH Patent Application

Stephen S. Gordon, inventor to NASA (Rockwell International Corp., Canoga Park, Calif.) Filed 30 Sep. 1986 11 p

(Contract NAS8-27980)
(NASA-Case-MFS-29207-1; NAS 1.71:MFS-29207-1;
US-Patent-Appl-SN-913447) Avail: NTIS HC A02/MF A01 CSCL 20F

The invention is directed to a coaxial extending metal mirror reflector attached to the electrode housing or gas cup on a welding torch. An electric welding torch with an internal viewing system for robotic welding is provided with an annular arc light reflector to reflect light from the arc back onto the workpiece. The reflector has a vertical split or gap in its surrounding wall to permit the adjacent wall ends forming the split to be sprung open slightly to permit the reflector to be removed or slipped onto the torch housing or gas cup. The split or gap also permits the feed of weld wire therethrough to the weld area. The reflected light provides an even light distribution onto the darker surrounding areas. Novelty lies in the use of a split annular arc light reflector on the end of a welding torch having an internal viewing system. NASA

N87-15787# Department of the Air Force, Washington, D.C.
NONLINEAR OPTICAL APPARATUS USING OPTICAL FIBERS Patent Application
Stephen C. Rand, inventor (to Air Force) Filed 3 Jun. 1986 13 p
(AD-D012439; US-Patent-Appl-SN-870048) Avail: NTIS HC A02/MF A01 CSCL 09/3

This document discloses a nonlinear second order signal processing apparatus having a number of high quality optical fibers that are embedded in a nonlinear optical material in such a way that their cores are in evanescent contact with one another and the nonlinear medium. GRA

N87-15788# Smithsonian Astrophysical Observatory, Cambridge, Mass.
SUPPORT OF MARK 3 OPTICAL INTERFEROMETER Final Report, 16 May 1985 - 15 May 1986
Michael Shao Jul. 1986 3 p
(Contract NOOO14-85-C-2212)
(AD-A171135) Avail: NTIS HC A02/MF A01 CSCL 20/6

A great deal of progress was made during the course of the contract on the fabrication of the components needed for the Mark III interferometer. At present, all of the mechanical, optical, electronic, and software components that are necessary for initial fringe observations have been designed, fabricated, or written. During the months of June and July, we will be shipping this equipment to Mt. Wilson. During July and August, we will be assembling, testing, and integrating the components into the instrument. We expect the first flight in September. The Mark III will be the first optical interferometric observatory in the U.S. and the first astrometric observatory to use a stellar interferometer. GRA

N87-15789# California Univ., Irvine. Dept. of Electrical Engineering.
INTEGRATED OPTIC MODULES FOR MULTICHANNEL DEFLECTION/SWITCHING AND SIGNAL PROCESSING Final Report, 18 Apr. 1981 - 30 Dec. 1985
Chen S. Tsai 30 Jul. 1986 30 p
(Contract DAAG29-81-K-0060)
(AD-A171178; ARO-17882.3-EL) Avail: NTIS HC A03/MF A01 CSCL 20/6

This report describes the investigation and realization of a number of new hybrid integrated optic device modules in LiNbO3 waveguides under the sponsorship of the Army Research Office. All of these device modules possess the desirable characteristics of very large bandwidth (GHz or higher), very small substrate size along the optical path (typically 1.5 cm), single-mode optical propagation, and low drive power requirement. The devices utilize either acoustooptic or electrooptic effects in planar or channel waveguides and, therefore, act as efficient interface devices between a light wave and temporal signals. Major areas of application lie in wideband multichannel optical real-time signal processings, communications, and computing. Some of the specific applications include correlation of RF signals, fiber-optic sensing, optical systollic array computing and multiport switching/routing, and analog-to-digital conversion of wideband RF signal. Author (GRA)

N87-15790# Naval Research Lab., Washington, D. C.
EMISSIVITY AS A FUNCTION OF SURFACE ROUGHNESS: A COMPUTER MODEL Memorandum Report, Sep. 1984 - Aug. 1985
Ira B. Schwartz and David Hon 29 Aug. 1986 35 p
(AD-A172230; NRL-MR-5816) Avail: NTIS HC A03/MF A01 CSCL 20/6

Surface geometry plays an important role in modelling backgrounds in the infrared. In particular, surface roughness of the ocean varies as a function of wind speed, and therefore it is important to realize the impact of surface roughness on self-emissions over a wide range of wavelengths and wind speeds. This paper describes the results of a computer model used to generate a synthetic surface as a function of wind speed on the average emissivity of the given surface. Surfaces generated with varying spectral content are compared. Capillary waves are shown to have a measurable effect on the average emissivity of the ocean surface, and therefore should not be ignored when constructing a model of the ocean surface. GRA

N87-15791# Dayton Univ., Ohio. Research Inst.
OPTICAL PROCESSING Final Report
A. C. Walker and W. Taylor Jun. 1986 149 p
(Contract N00014-85-K-0479)
(AD-A172362) Avail: NTIS HC A07/MF A01 CSCL 20/6

The major part of this work is directed towards development of large arrays of optically bistable gates for parallel processing applications. An important requirement of such arrays is an efficient system of illumination. Assuming a clear separation between each gate and its neighbours, then it is necessary to break the laser beam, which acts as the power input to the array, into a corresponding pattern of focussed beamlets. Holographic techniques are particularly suited to this purpose. In addition, we anticipate that holographic interconnects will play an important role in combining numbers of optical gate arrays to form parallel optical digital processors. With these requirements in mind we have assembled a facility dedicated to the production of holographic optical elements (HOEs) for specific use in optical digital circuits. To ensure high efficiency exploitation of available laser power we have chosen to use Dichromated Gelatin (DCG) as the (volume) emulsion. GRA

N87-15792# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
THE INFLUENCE OF A HIGH INDEX MICROLENS IN A LASER-TAPER COUPLING
J. F. G. deGroot Dec. 1985 49 p
(EUT-85-E-155; ISBN-90-6144-155-2; ISSN-0167-9708;
ETN-86-98711) Avail: NTIS HC A03/MF A01

The influence of the high index microlens mounted on a taper in a laser-fiber coupling scheme is investigated. The field phase and field amplitude effects by the lens are accounted for. The field in the taper is approximated by the HE11 mode field of a fiber of equal cross-section diameter, thus neglecting phase effects due to tapering. Compared to measurements, the calculated maximum attainable coupling efficiency curves prove to be too optimistic (by 10%) and too broad. Both these deviations can be reduced by incorporating the phase effects due to tapering. Model predictions show the optimum lens refractive index to be 1.9. However, calculations show that with a lens of refractive index 1.5, the coupling efficiency is much higher than with a flame polished round tip as lens. This is confirmed by measurements. In the case of a lens refractive index 1.9, the optimum lens diameter is the 35 microns being used. ESA

N87-15760# Osaka Univ. (Japan). Dept. of Welding Engineering.
IMPROVEMENT OF IMAGE QUALITY OF RADIOGRAPH BY MEANS OF NARROW AREA RADIATION METHOD
Tomio Senda, Kazuo Hirayama, and Keiji Yokoyama *In its*

Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 275-284 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N87-15793# European Space Agency, Paris (France).
PROCEEDINGS OF THE JOINT VARENNA-ABASTUMANI INTERNATIONAL SCHOOL AND WORKSHOP ON PLASMA ASTROPHYSICS
T. D. Guyenne, comp. and L. M. Zeleny, comp. Aug. 1986 588 p Proceedings held in Sukhami, USSR, 19-28 May 1986; sponsored by Academy of Sciences of the Georgian SSR, USSR, the Academy of Sciences, Moscow, USSR, ESA, and the International School of Plasma Physic
(ESA-SP-251; ISSN-0379-6566; ETN-87-98534) Avail: NTIS; HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20% others)

The Sun and its atmosphere; planetary and cometary magnetospheres; shock waves and particle acceleration; cosmic rays; astrophysical plasma emission; pulsar physics; nonlinear plasma processes; and magnetic dynamo processes were discussed. For individual titles, see N87-15794 through N87-15876.

N87-15794# Nobeyema Solar Radio Observatory (Japan).
RELATIVISTIC PLASMAS IN ACTIVE GALACTIC NUCLEI
Fumio Takahara *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 5-15 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20% others)

The processes and properties of relativistic astrophysical plasmas in connection with active galactic nuclei and quasars are discussed. Such plasmas are expected to be produced as a result of accretion onto massive black holes. Important elementary processes such as Comptonization and electron-positron pair production are reviewed. The properties of optically thin pair equilibrium plasmas are summarized and it is shown that pairs constrain the attainable states of the plasmas. Applications to accretion plasmas are attempted and the importance of the study of time-dependent problems is emphasized. Numerical results are also presented. ESA

N87-15795# Ecole Polytechnique, Palaiseau (France). Groupe de Physique Theorique.
KINETIC EQUATION FOR HAMILTONIAN SYSTEMS INTEGRABLE IN THE MEAN FIELD APPROXIMATION c64
J. F. Luciani and R. Pellat *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 17-20 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20% others)

A kinetic theory of finite systems and an equation for their microscopic average behavior are proposed. The equations of particle motion are supposed to be integrable in the mean collective field or (and) in an outside given field. The collision time is assumed to be longer than the characteristic orbit periods, which rules out a local theory of the Fokker-Planck, or Balescu-Lenard type. Two applications of the equation are foreseen: a finite plasma with a debye length comparable or larger than its size; a self confined gravitational system (i.e., a globular cluster) which is always a dilute system with a finite number of stars. The conditions of a statistical description of such a system are established. ESA

N87-15796# Academy of Sciences (USSR), Moscow. Inst. of Space Research.
EQUILIBRIUM AND STABILITY OF GALAXIES IN BINARY SYSTEMS c90
G. S. Bisnovatyi-Kogan *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 21-29 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20% others)

For galactic elliptical disks with quadratic gravitational potential in binary systems, equilibrium solutions are obtained to the noncollisional kinetic equation with a selfconsistent field. The companion is taken into account in a tidal approximation, preserving quadraticity of the potential. Stability of the solutions is investigated relative to bar-like perturbations corresponding to transitions between ellipses of different shape and oscillations of ellipses in the plane of symmetry. Aperiodic instabilities are shown to exist in binary systems, which are absent in single disks. ESA

N87-15797# Academy of Sciences (USSR), Moscow. Inst. of Astronomy.
THE INTERACTION OF ROTATING MAGNETIZED STARS WITH ACCRETING PLASMA
V. M. Lipunov *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 31-36 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20% others)

A generalized physical object, a gravimagnetic rotator is considered. It is specified by three characteristics: mass, magnetic field, and angular momentum. A rotator interacts with its environments (plasma) via the electromagnetic and the gravitational fields. Implications for X-ray and radio-pulsars, single white dwarfs, X-ray bursters, cataclysmic variables, magnetic stars, and quasars are described. ESA

N87-15798# Academy of Sciences (USSR), Moscow. Inst. of Pure and Applied Mechanics.
LABORATORY SIMULATION OF COLLISIONLESS COUPLING BETWEEN SUPERNOVA REMNANTS AND MAGNETIZED INTERSTELLAR MEDIUM
Yu. P. Zakharov, A. M. Orishich, A. G. Ponomarenko, V. G. Posukh, and V. N. Syntnikov *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 37-40 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20% others)

The method and results of laboratory simulation of the collisionless deceleration of supernova remnants in experiments on the interaction of a laser produced plasma cloud with a highly ionized magnetized background are presented. The processes and conditions of the collisionless interaction at various Alfven-Mach numbers, taking into account a finite Larmour radius of ions, were investigated. Modern observational data of historical supernova remnants are mentioned. The results may be used for analyzing phenomena connected with the collisionless interaction of the magnetized plasma flows in astrophysical, interplanetary, and circumterrestrial plasmas. ESA

N87-15799# Academy of Sciences (USSR), Moscow. Inst. of Space Research.
COSMIONS AND GALAXY FORMATION c90
T. A. Kahniashvili and V. N. Lukash *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 41-45 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20% others)

The dynamics of large-scale cosmological perturbations of density in the multicomponent Universe are reviewed. The role of

the log-factor which appears in the parametric gain and in the transfer function of primordial perturbations when heavy free particles are present along with light neutrinos and thermal radiation is studied. Collisionless damping of perturbations is discussed.
ESA

N87-15800# Academy of Sciences (USSR), Leningrad. Central Astronomical Observatory.
MAGNETIC FIELDS OF HOT STARS: OBSERVATION METHODS AND RESULTS c90
Yu. N. Gnedin and N. A. Silantiev *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 47-53 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20% others)

The effect of Faraday rotation is shown to lead to the appearance of linear polarization of stellar radiation in the optically thin electron-magnetized shell of hot stars, even when the shell is spherical. The position of maximum in the polarization spectrum is used to determine the magnetic field on a star surface. Using this method, the surface magnetic fields of Be, TTau and Herbig Ae/Be stars are estimated. The results of direct measurements of magnetic fields of hot stars are discussed. ESA

N87-15801# Milan Univ. (Italy). Dept. of Physics.
BLAZARS: BEAMED OR NOT BEAMED c90
A. Treves *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 55-59 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20% others)

Blazars are active galactic nuclei consisting of jet structures, whose bulk velocity and beaming is increasing towards the outside. The X-ray, optical, and radio emissions are produced at increasing distances from the center. This picture is suggested by a systematic study of the spectral shape at various frequencies and from the observation that in a number of objects the variability time scales decrease with frequency. The picture appears consistent with number counts for the class, without the requirement of special evolution of BL Lacs. ESA

N87-15802# Duesseldorf Univ. (West Germany). Inst. of Theoretical Physics.
VORTICES IN MAGNETIZED PLASMAS
K. H. Spatschek and E. W. Laedke *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 61-68 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20% others)

Electrostatic and electromagnetic models for plasma vortices are proposed. From the general description, the known simplified model equations can be (re)derived. The existence and stability of monopolar and dipolar vortex solutions are discussed. A method resulting in general criteria is proposed to study the dynamics of vortices under perturbations. ESA

N87-15803# Institute of Nuclear Physics, Novosibirsk (USSR).
GENERATION OF PLASMA FLOWS BY OSCILLATIONS OF MAGNETIC FLUX TUBES
M. P. Ryutova *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 71-75 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20% others)

Nonlinear phenomena consisting in generation of plasma flows and currents in structured magnetic fields are described. There are two main effects leading to these phenomena. First, it takes place due to the action of ponderomotive force on plasma, and second due to the absorption of the momentum and angular momentum of oscillations propagating along the magnetic flux tubes. If the absorption is provided mostly with one of the plasma components, then besides the generation of quite strong convective motions, it is accompanied by the excitation of currents which can distort the initial magnetic fields and their equilibrium conditions. ESA

N87-15804# Toyama Univ. (Japan). Dept. of Applied Mathematics and Physics.
EXPLOSIVE COALESCENCE OF CURRENT LOOPS AND PARTICLE ACCELERATION
Jun-ichi Sakai and Toshiki Tajima (Texas Univ., Austin.) *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 77-84 Sponsored in part by Tamura Foundation for Encouragement of Science and Technology (For primary document see N87-15793 07-75)
(Contract DE-FG05-80ET-53088; NSF ATM-82-14730; NSF ATM-85-06646)
Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20% others)

An explosive reconnection process associated with the nonlinear evolution of the coalescence instability is discussed through electromagnetic particle simulation and MHD particle simulation. The explosive coalescence of current loops is a process of magnetic collapse, in which the magnetic and electrostatic field energies and temperature explode toward the explosion time t0 as (t0-t)-8/3, (t0-t)-4, and (t0-t)-8/3, respectively. Since explosive coalescence exhibits self-similarity, a self-similar solution to the two-fluid plasma equations is sought. The theory produces indices of explosion in agreement with simulation results. Explosive simultaneous acceleration of ions and electrons becomes possible during the magnetic collapse by the electrostatic Vp x B acceleration. Applications of current loop coalescence to solar flares are discussed. ESA

N87-15805# Academy of Sciences (USSR), Moscow. Inst. of Terrestrial Magnetism, Ionosphere and Radiowave Propagation.
OSCILLATIONS AND WAVES IN SUNSPOTS c92
Yu D. Zhugzada *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 85-89 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20% others)

A linear transformation of magnetoatmospheric waves and resonance capture of waves in sunspots are considered. A theory of mutual transformation of all types of magneto-acoustic-gravity (MAG) waves in an isothermal atmosphere is developed. Sunspots are shown to contain three resonant layers, namely the chromospheric resonator for slow magneto-acoustic waves and two subphotospheric resonators for slow and fast waves. The resonators are coupled to each other through the wave transformation. A qualitative model for combined oscillatory convection in sunspots is proposed. A model of running penumbral waves based on the theory of linear transformation of MAG waves is constructed. ESA

N87-15806# Kharkov State Univ. (USSR).
ENERGY DISSIPATION AND CONVECTIVE MOTORS IN THE LOCAL MHD-RESONANCE REGIONS IN SOLAR CHROMOSPHERE c92
V. P. Vasilyev, V. I. Lapshin, and K. N. Stepanov *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 91-93 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20% others)

Local energy deposition in the upper solar chromosphere due to the dissipation of the forced oscillations of the high beta plasma in the cusp-resonance region is discussed. The heating rate of plasma layers is obtained. It does not depend on absorption mechanisms. The heating time of the layer is estimated. This time has the same order of magnitude as the time of thermal perturbation

relaxation at the altitudes considered. The absorption power density is of the order of the radiation power density from the solar atmosphere regions considered. For small amplitude oscillations, the energy absorption should be expected in the linear regime when the dissipative effects are essential. As a rule, the dissipative effects are small and the forced oscillations in the local resonance regions take place in the strong nonlinear regimes with the formation of discontinuous flows. ESA

N87-15807# Academy of Sciences (USSR), Moscow. Inst. of Nuclear Research.
HELIOSEISMOLOGY AND THE INTERNAL STRUCTURE OF THE SUN **c92**
E. A. Gavryuseva *In* ESA Proceedings of the joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 95-100 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20% others)

Observations of gravity and acoustic solar oscillations are described. The theoretical analysis of this data is carried out. The results of the determination of the sound speed and differential rotation are presented. The prospects of helioseismology are considered. ESA

N87-15808# Leningrad (A. A. Zhdanov) State Univ. (USSR).
ION ACCELERATION IN SOLAR FLARES ENRICHED BY HELIUM-3 AND IN GAMMA-RAY LINE FLARES **c92**
L. G. Kocharov and G. A. Kovaltsov *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 101-104 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

Solar energetic particle, X, and gamma ray observations show that during a solar flare heating of the bulk of the particles and their acceleration take place. The characteristic proton energy (the minimum energy in the power-law spectrum) is shown to be 400 KeV. In impulsive flares, the acceleration time for protons with energy = 30 MeV is less than or = 2 sec. For these flares the parameters of the acceleration region are: size = 1 to 5 million m, density = 10 to the 11th to 13th power cc, magnetic field B = 300 to 2000 Gs. The energy contained in the accelerated ions changes from flare to flare: it is very small in He-3 rich flares and (almost) reaches by an order of magnitude, the thermal and magnetic energy of plasma in the most powerful impulsive flares. In gradual flares the acceleration mechanism may operate at lower densities (1 billion cc) and accelerate ions at a longer time scale (10 min). ESA

N87-15809# Abastumani Astrophysical Observatory, Georgia (USSR).
PROPAGATION OF NONLINEAR MODULATED ALFVEN WAVES IN SPICULES AND MAGNETIC FLUX TUBES **c92**
A. D. Pataraya and B. B. Chargeishvili *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 105-107 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

The propagation of linear waves in the magnetic flux tubes which exist in astrophysical objects is discussed. Solar prominences, particularly the chromospheric spicules are emphasized. In order to investigate the propagation of linear waves in the cylindrical layer of the magnetic flux tube, which is homogenous along its axis, the dispersion relations are obtained. When studying the propagation of linear waves in the isolated magnetic flux tube, which is inhomogeneous along its axis, the lower boundary for wave frequency which passes through the tube, is found. The spicule appearance mechanism is suggested. ESA

N87-15810# Abastumani Astrophysical Observatory, Georgia (USSR).
MERGING INSTABILITY OF MAGNETIC ISLANDS
A. L. Taktakishvili and L. M. Zeleny *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 109-111 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

Linear collisionless kinetic theory of merging instability of magnetic islands in the plasma current layer with strong longitudinal magnetic field (i.e., along the equilibrium current) is presented. The growth rate of the instability turns out to increase with the growth of the island width and is inversely proportional to the longitudinal field. It is shown that the explosive growth of magnetic islands takes place on the stage of merging. These facts are in qualitative agreement with MHD theories and numerical simulation results. ESA

N87-15811# Toyama Univ. (Japan). Faculty of Engineering.
PREFLARE ACCELERATION BY MAGNETIC TRAPPING IN SHEARING ARCADES **c92**
J. Sakai, T. Tajima (Texas Univ., Austin.), and R. Sugihara (Nagoya Univ. (Japan).) *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 113-116 (For primary document see N87-15793 07-75)
(Grant NSF ATM-85-06646)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

A dynamical global magnetic configuration of a preflare is presented. It is shown that particles trapped in the solar corona moving shear magnetic field can be accelerated within the order of a cyclotron period by the V(p) x B acceleration mechanism in the preflare stage when the arcade-like magnetic flux ascends. This is accompanied by enhancement of magnetic shear due to photospheric shear motions. ESA

N87-15812# Academy of Sciences, Potsdam (East Germany). Zentralinst. fuer Astrophysik.
TOPOLOGICAL STABILITY OF MAGNETIC FIELDS IN SPATIAL DOMAINS WITH BOUNDARIES AND FINITE-LENGTH FIELD LINES **c92**
N. Seehafer *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 117-120 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

The role of topological instability of magnetostatic equilibria in the generally observed activity of cosmic magnetic fields, e.g., solar coronal heating and flares, is assessed. Finite length magnetic flux tubes, representative of e.g., solar atmospheric loops, are topologically stable under rather general conditions. The tearing-mode mechanism is unlikely to play a role in such tubes. A local change of the topology is possible when the magnetic field gradient matrix becomes singular at a magnetic neutral point, in general connected with the merging or/and splitting up of neutral points. In solar active regions, there is observational evidence for flare activity at separatix surfaces which are made up of field lines tangential to the photosphere at one end and which define a cell structure of the field. ESA

N87-15813# Indian Inst. of Science, Bangalore.
SOME INTERESTING FEATURES IN THE DRIFT PAIR PHENOMENA OF SOLAR DECAMETRIC RADIATION **c92**
G. Thejappa, N. Gopalswamy, C. N. Sastry, and M. G. Aubier *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 121-125 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

Observational results on drift pair (DP) chains and vertical DP bursts in the decametric solar corona are reported. As the magnetic field in this region is predominantly open, a free energy source propagating sunward most of the time cannot explain the pre-

dominant reverse drift pair chains. The appearance of the vertical chains and DPs rules out the possibility of an agency moving in the corona causing the observed drift. Observations support the idea that the resonance layer in which the radiation is generated is different at different instants of time so that one gets a slope in the frequency-time plane. If considerable fluctuations in macroscopic parameters are assumed, it is possible to have drifts of all directions as the drift rate depends upon the medium in which the fluctuations occur. It is shown that the magnetic field decreases steeply if the density of the medium is not affected by the DP activity when the frequency drift is very high. ESA

N87-15814# Academy of Sciences (USSR), Moscow. Inst. of Space Research.

THE CRITICAL IONIZATION VELOCITY PHENOMENON IN ASTROPHYSICS **c90**

A. A. Galeev and I. Ch. Chabibrachmanov *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 129-136 (For primary document see N87-15793 07-75)

Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

Observational evidence of critical ionization velocity phenomenon provided by measurements in the Io plasma torus and in the comae of Halley's Comet is discussed. The consequences of possible development of these phenomena for the line emission from supernovae shells and plasma jets from active galaxy nuclei are considered. The main effect is produced by suprathermal electrons generated in this process. ESA

N87-15815# Academy of Sciences (USSR), Moscow. Inst. of Space Research.

SPONTANEOUS RECONNECTION AT THE BOUNDARIES OF PLANETARY MAGNETOSPHERES **c91**

M. M. Kuznetsova and L. M. Zeleny *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 137-146 (For primary document see N87-15793 07-75)

Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

The theory of localized spontaneous reconnection at the boundaries of the magnetospheres of Solar system planets with strong intrinsic magnetic field is given. Localized sporadic reconnection patches are observed by satellites and other space probes in the form of so-called magnetic flux transfer events at Mercury, Earth, and Jupiter. The physical factors, controlling the temporal and spatial scales of this phenomenon in dependence on the distance from the Sun (the parameters of the solar wind) and the planetary magnetic dipole moment are discussed. The theoretical estimates, based on percolation model of spontaneous reconnection agrees satisfactorily with experimental data. The typical flux transfer parameters for Saturn and other astrophysical objects are evaluated. ESA

N87-15816# Abastumani Astrophysical Observatory, Georgia (USSR).

INVESTIGATION ON THE INTENSITY PROGRESSION OF F-REGION NIGHTGLOW EMISSION OF THE OXYGEN RED LINE BY MEANS OF ATMOSPHERIC GRAVITY WAVES SOLITON **c46**

G. G. Didebulidze, L. M. Fishkova, and D. Pataraya *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 147-150 (For primary document see N87-15793 07-75)

Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

The behavior of electron density at night F-region of the Earth ionosphere and the influence of atmospheric gravity wave solitons (SAGW) are investigated. The horizontal wind is taken into account. It turns out that the height of the electron density maximum changes depending on directions of the soliton drift velocity and wind. The electron density peak falls when SAGW drifts from north to south and it rises when the drift direction is from south to north. The results are used to explain the airglow oxygen red line 6300A intensity progression. ESA

N87-15817# Tbilisi State Univ. (USSR). Inst. of Geophysics.

THE PROBLEM OF THE MHD FLOW NEAR STAGNATION POINT OF THE CURRENT SHEET **c92**

A. G. Khantadze and Z. A. Kereselidze *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 151-154 (For primary document see N87-15793 07-75)

Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

Modeling of interaction between the solar wind and the Earth's magnetosphere in the approximation to magnetic hydrodynamics is discussed. The problem is to solve a system of MHD equations of a compressible conducting liquid, which describes an interaction between the interplanetary magnetic field and the magnetic field of the Earth, as well as the dynamic structure of the plasma flow near the magnetosphere. A physical possibility of MHD motion requires that the velocity field and the magnetic field satisfy kinematic and dynamics conditions of motion possibility. These conditions make it possible to select only real motions among a variety of kinematically possible motions. It is shown that the conditions of the dynamic possibility of motions are met automatically for MHD flows of incompressible liquids of the type considered in the problems of Parker and Sonnerup (1973) and Sonnerup and Priest (1975). ESA

N87-15818# Polish Academy of Sciences, Warsaw. Space Research Center.

MAGNETOSPHERIC TAILS IN THE SOLAR PLANETARY SYSTEM **c92**

W. Macek and S. Grzedzielski *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 155-161 (For primary document see N87-15793 07-75)

Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

Magnetospheric tails resulting from the interaction of a celestial body moving relative to the ambient magnetized plasma are discussed. A hydromagnetic model of a long planetary tail is presented. The tail is assumed to be a long structure in pressure equilibrium with the solar wind and with a partially open boundary. The model describes the basic properties (size, lobe, magnetic field, and plasma density) of the quiet distant terrestrial and jovian magnetotails as seen in the ISEE-3/and Voyager-1 data (at distances 200 Earth radii and 6000 Jupiter radii correspondingly behind the planets). ESA

N87-15819# Academy of Sciences, Berlin (East Germany). Inst. of Cosmic Research.

A FLUID SIMULATION OF THE AMPTE NEUTRAL GAS RELEASE IN THE SOLAR WIND **c92**

K. Sauer and K. Baumgaertel *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 163-168 (For primary document see N87-15793 07-75)

Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

The effects of a neutral gas release in the solar wind on the plasma flow dynamics were studied using a one-dimensional fluid model. Mass loading due to the pick-up of ions created by photoionization leads to a slowdown of the solar wind flow and the formation of a shock. The frozen-in magnetic field reacts by the formation of a compressed field region upstream and a magnetic cavity downstream. The fluid model is capable of reproducing details of the magnetic field variation observed in the AMPTE experiment. A simple magnetic response model which captures the basic physics involved in this behavior is proposed. ESA

N87-15820# Universidad Nacional Autonoma de Mexico, Ensenada. Inst. de Geofisico.

MODELS OF THE VENUS IONOSPHERIC FLOW c91
H. Perez-de-Tejada *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 169-173 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

It is argued that experimental measurements of the velocity of the plasma within and outside the Venus ionosphere are consistent with the concept that an efficient transfer of momentum takes place across the ionopause. The data is examined in regard to the relative participation of mass loading, charge exchange collisions and viscous processes to produce the observed deceleration of the shocked solar wind. ESA

N87-15821# Academy of Sciences (USSR), Moscow. Inst. of General Physics.
MAGNETIC RECONNECTION, GENERATION OF PLASMA FLUXES AND ACCELERATED PARTICLES IN LABORATORY EXPERIMENTS AND SPACE PLASMA
S. Yu. Bogdanov, A. G. Frank, N. P. Kyrei, and V. S. Markov *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 177-183 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

Solar flare type phenomena were simulated. The physical conditions are compared on the basis of typical dimensionless parameters. The effective transformation of magnetic energy into accelerated particles and intensive superthermal plasma fluxes was observed in laboratory devices in the course of explosive disruption of the current sheet. The process is similar to that observed during the solar flare. ESA

N87-15822# Academy of Sciences (USSR), Moscow. Inst. of General Physics.
MAGNETIC BOUNDARY AND ACCELERATION OF CHARGED PARTICLES IN SPATIALLY NONUNIFORM CONFIGURATIONS
S. V. Bulanov *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 185-194 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

The formation of current sheets in three dimensional magnetic configurations near zero points and zero lines of a magnetic field is discussed. The separatrix surfaces play an important role. The current sheet stability and its rupture is considered. The acceleration of charged particles near null points of a magnetic field in the presence of a uniform electric field is investigated. Solar and stellar flares are described. ESA

N87-15823# Academy of Sciences, Potsdam (East Germany). Central Inst. of Astrophysics.
STOCHASTIZATION OF CHARGED PARTICLE MOTION NEAR A MAGNETIC FIELD REVERSAL AND THE PROBLEM OF EXPLOSIVE RECONNECTION c46
J. Buechner and L. M. Zeleny *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 195-201 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

A simple mechanism that explains the transition to instability of the Earth's magnetotail is proposed. The instability is shown to be triggered by a stochastization of the electron motion, caused by a strong interaction between gyration and the field-aligned degree of freedom. It is shown that the usual evolution of the tail always leads to a state where the resonance condition = Bn/Bo root L/Seo is fulfilled (Bn and Bo are the tangential and normal components of the tail-magnetic fields, Seo and L the electron-Larmor-radius in and the characteristic width of the tail-plasma sheet). ESA

N87-15824# Institute of Nuclear Physics, Novosibirsk (USSR).
MAGNETIC ENERGY DISSIPATION IN A RAREFIED PLASMA BY THE RELAXATION PROCESS
G. E. Vekstein *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 203-207 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

Coronal heating by relaxation to the minimum magnetic energy state in highly conductive plasmas is considered. Such a heating is provided by photospheric fluid motions that permanently build up coronal electric currents, likely to be force free. The redundant magnetic energy connected with these currents may be dissipated by the complex magnetic reconnection processes. This turbulence is treated phenomenologically by introducing a characteristic relaxation time. Such an approach allows expression of the rate of coronal heating in terms of a photospheric driver. ESA

N87-15825# Indian Inst. of Geomagnetism, Bombay.
SPONTANEOUS RECONNECTION IN THE EARTH'S MAGNETOTAIL c46
G. S. Lakhina and K. Schindler (Ruhr Univ., Bochum (West Germany).) *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 209-213 Sponsored by Alexander von Humboldt Stiftung and the Deutschen Forschungsgemeinschaft (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

It is shown that the shear flow in the geomagnetic tail plasma sheet boundary layer and in the plasma mantle, as well as mirror type pressure anisotropy, can increase the growth rate and the region of unstable wave number of the ion tearing mode instability in the plasma sheet region. The typical growth time for the ion tearing instability in the presence of shear flows is found to be as short as 2 min. Hence a rapid reconnection in the near Earth plasma sheet would occur, leading to substorm onset. ESA

N87-15826# Academy of Sciences (USSR), Moscow. Inst. of General Physics.
RADIATIVE-RESONANT ACCELERATION BY PLASMA TURBULENCE
V. N. Tsytovich *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 217-228 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

The physical principles of radiative-resonant acceleration are described in connection with generation of galaxies, jets, sources of type 3 solar radio bursts, and generation of cosmic magnetic fields. Particle acceleration in a strong quantized magnetic field, and generation of cosmic ray spectra are discussed. ESA

N87-15827# Nagoya Univ. (Japan). Inst. of Plasma Physics.
RESONANT ION ACCELERATION BY MAGNETOSONIC SHOCK WAVES
Y. Ohsawa *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 229-236 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

It is shown by theory and a relativistic, electromagnetic particle simulation that strong ion acceleration occurs in a fast magnetosonic shock wave. The maximum speed of trapped ions can be (mi/me)1/2 times as large as the Alfven speed in a quasiperpendicular shock where (mi/me) is ion-to-electron mass ratio. The acceleration takes place even in laminar shock waves. The magnitude of the acceleration increases with Omega ce/Omega pe and is enhanced by finite beta effects. For a parameter regime Omega ce/Omega pe greater than or = 1 highly relativistic

ions and electrons are produced simultaneously in the shock ramp. The structure of a nonlinear slow wave and associated resonant ion acceleration is discussed. ESA

N87-15828# Nagoya Univ. (Japan). Dept. of Astrophysics.
VERY HOT INTERSTELLAR MATTER HEATED BY A GALACTIC SHOCK WAVE
S. Hayakawa *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 237-242 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

Origins of the very hot component in the galactic ridge are discussed. The formation of such a hot component by supernova shock wave heating requires an unconfortably high rate of supernova explosion. An explosion with energy of 10 to the 58th power erg may have occurred a few million years ago in the galactic center and produced a shock wave to heat the matter in the galactic ridge. The observed X-ray features can be consistently explained with this model. The ejecta of the explosion may contain Al-26 of 10 solar masses which can give 1.8 MeV gamma rays, as observed. ESA

N87-15829# Academy of Sciences (USSR), Moscow. Inst. of Terrestrial Magnetism, Ionosphere and Wave.
INFLUENCE OF REFLECTED IONS ON THE FRONT STRUCTURE OF QUASI-PERPENDICULAR COLLISIONLESS SHOCK WAVES
V. S. Arefiev, V. V. Krasnoselskikh, M. A. Balikhin, M. E. Gedalin, and D. G. Lominadze *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 243-252 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

Collisionless plasma shock wave formation and stationarity are discussed. The role of hydrodynamic overturning in the shock formation and the role of weak dissipation are considered. Ion reflection at an electric field drop is analyzed. It is shown that a number of subtle details of the shock wave structure can be interpreted as simple consequences of the wave large-scale structure. ESA

N87-15830# Nobeyema Solar Radio Observatory (Japan).
MONTE CARLO SIMULATION OF PARTICLE ACCELERATION BY SHOCK WAVES
F. Takahara *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 253-256 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

The spectra of energetic particles accelerated diffusively by spherically expanding shock waves are investigated by the time dependent Monte Carlo method. Results show that the resultant spectrum strongly depends on the motion and distribution of scattering centers and history of particle injection. Thus certain conditions should be satisfied in order to realize the universal power law spectrum by diffusive shock acceleration of energetic particles. ESA

N87-15831# Academy of Sciences (USSR), Leningrad. Inst. of Physics and Technology.
COSMIC RAY ARCHAEOLOGY, SOLAR ACTIVITY AND SUPERNOVA EXPLOSIONS c93
G. E. Kocharov *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 259-270 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

The status and potential of studying the cosmic ray flux level over long time scales by high precision measurements of radiocarbon content in tree rings and of Be-10 in polar ice cores are reviewed. Cosmic ray intensity modulation during the exceedingly low solar activity period (Maunder minimum), the established regularity in low solar activity states, and evidence for a supernova explosion not far from the solar system 10 to 15,000 yr ago are discussed. ESA

N87-15832# Academy of Sciences (USSR), Yakutsk. Institute of Cosmophysical Research and Aeronomy.
THE ROLE OF COSMIC RAYS IN SUPERNOVAE SHOCK DYNAMICS c93
E. G. Berezhko *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 271-278 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

The influence of cosmic rays undergoing a regular acceleration upon shock structure and dynamics was studied. It is established that at the adiabatic stage of supernova blast wave, the cosmic rays having reached maximum energy escape intensively from the vicinity of shock front. This particle escape effect can lead to a significant change of shock compression ratio. It is shown that a precursor formed by cosmic ray pressure is unstable with respect to excitation of magnetoacoustic waves. The role of this instability in high-energy particle generation is discussed. ESA

N87-15833# Academy of Sciences (USSR), Moscow. Inst. of Terrestrial Magnetism, Ionosphere and Radio Wave Propagation.
HYDRODYNAMICS OF INTERSTELLAR MEDIUM INCLUDING COSMIC RAYS c93
V. S. Ptuskin *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 279-286 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

A system of MHD equations, which takes into account the action of cosmic rays, is discussed. The influence of cosmic rays on the stability of hydrostatic equilibrium of the galactic halo is considered. The interaction between long hydromagnetic waves and cosmic rays is analyzed. ESA

N87-15834# Academy of Sciences (USSR), Moscow. Inst. of Physics.
PROBLEMS OF COSMIC RAY ACCELERATION IN GIANT MOLECULAR CLOUDS c93
V. A. Dogiel, A. V. Gurevich, Ya N. Istomin, G. S. Sharov, and K. P. Zybin *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 287-296 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

Distribution, acceleration, and energy losses of cosmic rays in the vicinity of molecular clouds are investigated. Observations indicating increased cosmic ray density inside molecular clouds are discussed. The necessary condition for cosmic ray acceleration are determined. The form of particle spectra is calculated in energy ranges where an acceleration or energy losses is the main factor. In the frame of the model of particle acceleration inside molecular clouds, the nature of unidentified gamma-ray sources and anomalies of chemical composition of cosmic rays are explained. ESA

N87-15835# Academy of Sciences (USSR), Moscow. Inst. of Space Research.
INJECTION MECHANISM FOR THE COSMIC RAY ACCELERATION BY SHOCKS c93
A. A. Galeev, R. Z. Sagdeev, and V. D. Shapiro *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 297-305 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

The mechanism of particle injection of cosmic rays into the process of acceleration is considered. The mechanism is based

on the quasilinear energy diffusion of thermal plasma particles caused by Alfven waves generated by cosmic rays. ESA

N87-15836# Academy of Sciences (USSR), Moscow. Inst. of Space Research.
MASS LOADING AND MHD TURBULENCE IN THE SOLAR WIND/COMET INTERACTION REGION **c90**
A. A. Galeev, R. Z. Sagdeev, V. D. Shapiro, V. I. Shevchenko, and K. Szego (Hungarian Academy of Sciences, Budapest.) *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 307-315 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

The hydromagnetic turbulence near comets generated by cometary ions that mass-load the solar wind is discussed. Intense Alfven waves are excited even at distances up to several million kilometers away from the comet. Presence of these waves influences essentially the motion of the mass-loaded solar wind as well as the position and the structure of the cometary shock. The weak turbulence theory of cometary ion interaction with the solar wind is presented. ESA

N87-15837# Academy of Sciences (USSR), Moscow. Inst. of Terrestrial Magnetism, Ionosphere and Radiowave Propagation.
COLLECTIVE INTERACTIONS OF NEUTRINOS WITH DENSE ASTROPHYSICAL PLASMAS
V. N. Oraevsky and V. B. Semikoz *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 321-324 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

It is shown that in a dispersive medium the neutrino acquires an induced electric charge, due to medium polarization irrespective of the neutrino rest-mass. The self-consistent electromagnetic A-field is taken into account in the relativistic kinetic equation for neutrino derived by Bogolyubov's method to give the electric form factor and charge of neutrino. It is shown that the existence of a massless long-range weak Z-field provided polarization of a medium by moving neutrinos. Polarization and Vavilov-Cerenkov losses of the zero-mass neutrino in metal plasma and in cooling magnetic stars are considered. ESA

N87-15838# Nice Univ. (France). Lab. de Physique de Matiere Condensee.
TIME DEPENDENT BEHAVIOR OF INTERSTELLAR MASER FEATURES DUE TO STIMULATED SCATTERING THROUGH DENSE PLASMA CLOUDS **c36**
C. Montes *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 325-330 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

Compact H2O interstellar sources of maser emission which show strong and rapid variability of flux intensity with time are discussed. It is suggested that stimulated ion-Compton or Brillouin backscattering of the superradiant radiation flux interacting with partially trapped radiation (due to reflection from the circumstellar plasma cloud boundaries), could explain such rapid time dependent behavior. ESA

N87-15839# Sydney Univ. (Australia). School of Physics.
MAGNETOSPHERIC AND SOLAR RADIATION FROM LOSS-CONE DRIVEN TEST INSTABILITIES **c93**
D. B. Melrose and R. G. Hewitt *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 331-336 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

Loss-cone driven instability generation of intense planetary and solar radio emissions is considered. If the electron cyclotron frequency to plasma frequency ratio is less than or = 1, electron cyclotron maser emission produces intense radiation, predominantly in the magnetoionic x mode. If the ratio is much less than one, plasma emission occurs, generating Langmuir waves which can interact with other waves or coalesce to produce weakly polarized escaping radiation. The theories of these two coherent emission mechanisms are reviewed. Extensions of the basic electron cyclotron maser theory to take into account inhomogeneities in the source region and to explain fine structures in the emissions are also discussed. ESA

N87-15840# Abastumani Astrophysical Observatory, Georgia (USSR).
NONLINEAR CONVERSION EMISSION MECHANISMS IN THE OPEN PLASMA SYSTEMS IN ASTROPHYSICS
M. E. Gedalin, J. G. Lominadze, S. B. Isakov (Moscow Physical-Technical Inst. (USSR).), V. S. Krivitsky, and V. N. Tsytovich (Academy of Sciences (USSR), Moscow.) *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 337-341 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

Nonlinear mechanisms of wave conversion in open nonequibibrium systems with energy flow dissipation into the radiation are discussed. It is shown that the amplification of electromagnetic waves is possible in such systems. Nonrelativistic plasma with a collisional dissipation is considered. The properties of relativistic electronpositron plasma in the strong magnetic field when the dissipation is connected with the synchrotron radiative losses are analyzed. ESA

N87-15841# Abastumani Astrophysical Observatory, Georgia (USSR).
DISTORTIONS OF POWER-LAW OF ELECTRONS IN TURBULENT PLASMA REACTOR
R. D. Lomadze *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 343-345 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

Cerenkov effect and ionization losses are considered as causes of distortions of the power-law distribution function of relativistic electrons in the region of low energies in a turbulent plasma reactor. Limitations on energetic interval of the power-law distribution function are determined. The curvature signs of the distortions are estimated. Interpretation of peculiarities in the radiation spectra of decametric cosmic radio sources is discussed. ESA

N87-15842# Simferopol M. V. Frunze State Univ. (USSR).
REDISCUSSION OF THE MODEL ATMOSPHERE OF VEGA **c89**
E. I. Terez *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 347-350 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20% others)

It is shown that the best agreement with experimental results is obtained for the model atmosphere of Vega star with parameters: T eff = 9590 K and log g = 3.95. It is found that the measured fluxes are in excess over the model atmosphere calculations for wavelengths beyond 1 micron. This excess is not due to short wavelength radiation from the dust cloud around Vega. ESA

N87-15843# Leiden Univ. (Netherlands).
RADIATIVE ACCELERATION OF CLOUDS NEAR COMPACT ACCRETING OBJECTS
V. Icke and F. Eulderink *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 351-356 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member

States, AU, CN, and NO (+20% others)

A model of the bisymmetric ejection of gas observed near compact accreting objects is proposed. A dense gas cloud is formed above an accretion disk (e.g., by instability of the inner parts of that disk). This gas blob is then collimated, confined, and accelerated by the intense radiation field of the disk. As the blob is blown out, some of its material is peeled off by shear with the surroundings. This may cause the appearance of a continuous jet. Calculations show that gas blobs can be accelerated to the very high speeds inferred for very long baseline interferometry sources. Global conditions that must prevail in the disk and the cloud for such acceleration to be efficient are derived. It is concluded that the scenario is a viable alternative for continuous gas flow in jets. ESA

N87-15844# Academy of Sciences (USSR), Moscow. Inst. of Physics.

PHYSICS OF PULSAR MAGNETOSPHERE

V. S. Beskin, A. V. Gurevich, and Ya. N. Istomin *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 361-373 (For primary document see N87-15793 07-75)

Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

A self-consistent model of pulsar magnetosphere is constructed. The model is based on solution of equations which describe the global properties of neutron star magnetospheres and on comparison of predictions of the theory with observation. ESA

N87-15845# Academy of Sciences (USSR), Gorky. Inst. of Applied Physics.

RADIATION TRANSFER AND RADIATION PRESSURE ON PLASMA BY MAGNETIC DEGENERATES c93

V. V. Zheleznyakov and A. A. Litvinchuk *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 375-381 (For primary document see N87-15793 07-75)

Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

Interaction between magnetized plasma and cyclotron radiation is investigated. Joint action of collisions and radiative transitions between Landau levels on electron distribution is considered. The transfer equation for cyclotron radiation is derived and its solutions for the limiting cases of quasi-homogeneous and strongly inhomogeneous magnetic field are found. The case of a strongly inhomogeneous magnetic field is analogous to Sobolev's approximation in the theory of stellar atmospheres. Radiation pressure on plasma in cyclotron lines is compared with the continuum radiation pressure. The results were used to investigate coronal plasma of isolated magnetic white dwarfs, accreting plasma above the hot spot of X-ray pulsars, and electron-positron plasma in the region of annihilation line formation of gamma-burst sources. ESA

N87-15846# Academy of Sciences (USSR), Leningrad. Inst. of Physics and Technology.

QUANTUM EFFECTS IN SYNCHRONIZATION RADIATION OF A PLASMA IN SUPERSTRONG MAGNETIC FIELDS OF NEUTRON STARS

G. G. Pavlov *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 383-391 (For primary document see N87-15793 07-75)

Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

Synchrotron emission in magnetic fields of neutron stars is considered on the basis of quantum theory. The quantization of transverse electron motion in a magnetic field is important for b greater than or = epsilon(epsilon - 1) where b = B/4.4 times 10 to the 13 th power G, epsilon is a typical electron energy in units of mc sq. The quantum recoil of a radiating electron is significant for b greater than or = (epsilon - 1)/epsilon sq. Quantization of electron motion leads to asymmetric peaks in the radiation spectra at the energies h omega = mcsq (root 1 + 2 n'b - root 1 + 2 nb)/sin upsilon, where n', n = 0,1, ..., and upsilon is the angle between B and the wave vector. The quantum recoil softens the spectra. The quantum effects change characteristics of maser instabilities in strongly magnetized plasmas. ESA

N87-15847# Academy of Sciences (USSR), Leningrad. Inst. of Physics and Technology.

TWO-PHOTON ANNIHILATION RADIATION IN STRONG MAGNESTIC FIELD c90

A. D. Kaminker, G. G. Pavlov, and P. G. Mamradze *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 393-398 (For primary document see N87-15793 07-75)

Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

The relativistic expressions for the intensity and polarization of the two-photon annihilation radiation from a ground-state gas of electrons and positrons in the presence of a static, uniform magnetic field are derived for the case of negligible small relative velocity of electrons and positrons, and for the case of a thermal distribution of electrons and positrons with temperature T = t(mc2/K), when the magnetic field is not too strong B/Bcr much less than min (t, 1). Simple analytical expressions for the limiting cases are obtained and numerical evaluations of the radiation intensivity I and its parameter G, and polarization degree are presented. ESA

N87-15848# Academy of Sciences (USSR), Moscow. Inst. of Physics.

BOUND ELECTRON-POSITRON PAIR CREATION BY GAMMA-QUANTA IN SUPERSTRONG MAGNETIC FIELD OF PULSARS c90

A. E. Shabad and V. V. Usov *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 399-404 (For primary document see N87-15793 07-75)

Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

The curvature gamma-quanta emitted in pulsar magnetospheres tangentially to the curved lines of force of the magnetic field are shown to be later canalized along the magnetic field, if it is strong enough, by gradually converting into a mutually bound electron-positron pair, i.e., a positronium atom. This happens before the photon reaches the threshold of free pair creation. The positronium is stable against the ionizing action of the electric field near the pulsar unless it reaches a critical value of 10 million CGSE. This may prevent the screening of the electric field up to the distances from the pulsar, where the magnetic field is already below the value of 0.1 Bcr and free pair creation may become essential. This effect provides a higher theoretical estimate for the total luminosity of pulsars (whose field at the surface Bs exceeds 0.1 Bcr) as compared to the conventional one. ESA

N87-15849# Abastumani Astrophysical Observatory, Georgia (USSR).

THE GENERATION OF RADIO WAVES IN THE INHOMOGENEOUS MAGNETIC FIELD OF THE PULSAR MAGNETOSPHERE c93

A. Z. Kazbegi, G. Z. Machabeli, and G. I. Melikidze *In* ESA Proceedings of the Joint Varenna-Abastumanii International School and Workshop on Plasma Astrophysics Aug. 1986 p 405-410 (For primary document see N87-15793 07-75)

Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

The generation of radio waves in the plasma of a pulsar magnetosphere is considered, given the inhomogeneity of the dipole magnetic field. It is shown that for longitudinal waves and the resonance case, taking into account the curvature of magnetic field lines leads to the decrease of the analogous growth rate related to the case RB tends to infinity (RB being the curvature radius). In the nonresonance case, calculations show that for longitudinal and electromagnetic waves, the growth rate of the electromagnetic waves, the growth rate of the instability is of the order of 1/to (to is the time of carrying plasma outside the light

cylinder). However, the generation of electromagnetic waves by Cerenkov resonance is possible. Estimations show that the development of this instability is possible only for pulsars of age greater than 10,000 yr. ESA

N87-15850# Academy of Sciences (USSR), Moscow. Inst. of Physics.
ELECTRODYNAMICS OF INHOMOGENEOUS RELATIVISTIC ELECTRON-POSITRON PLASMA AND RADIO EMISSION OF PULSARS **c93**
V. S. Beskin, A. V. Gurevich, and Ya. N. Istomin *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 411-415 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

The dielectric permeability tensor of an inhomogeneous electron-positron plasma is derived. Natural modes of electromagnetic oscillations and their polarization are found. Their increments and amplification coefficients are determined. The trajectories of propagation of the amplified modes and their connection with the observed radio wave going to infinity are calculated. It is shown that a relativistic plasma moving along a strong curvilinear magnetic field is unstable. The instability which leads to generation of electromagnetic waves is hydrodynamic. It is related to Cerenkov excitation of curvature radiation and has high increments. In pulsar magnetospheres, the instability stimulates intense excitation of field and plasma oscillations in the region of open field lines. At a distance (10 to 100) R from a neutron star these oscillations are transformed into ordinary radio emission with a frequency range 0.01 to 10 GHz. ESA

N87-15851# Abastumani Astrophysical Observatory, Georgia (USSR).
INVESTIGATION OF SUBPULSE DRIFT IN PULSARS MEANING THE CORIOLIS FORCE AND INHOMOGENEITIES **c93**
A. D. Pataraya, B. B. Chargeishvili, and M. Z. Zedginidze (Tbilisi State Univ. (USSR).) *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 417-419 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

The periodical drift of pulsar subpulses is explained by modulation of radio waves by the low frequency waves. Applying relativistic MHD and Coriolis force, the dispersion relations for the low frequency waves are obtained. ESA

N87-15852# Academy of Sciences (USSR), Moscow. Inst. of Terrestrial Magnetism, Ionosphere and Radiations.
GAMMA-POSITRONIUM IN THE MAGNETOSPHERE OF A PULSAR **c90**
L. B. Lenison and V. N. Oraevsky *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 421-424 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

It is shown that the curvature gamma-quanta emitted in the pulsar magnetosphere tangentially to the curved lines of force of the magnetic field transform into positronium atoms, which are stable and can be ionized only by thermal radiation from the neutron star surface. It means that the intensity of production of electron - positron plasmas and the temperature of the polar spot can be calculated self-consistently. A dependence of the transition probability gamma yields Ps on the transversal wave vector of the photon carries a resonance character. In the vicinity of the resonance K (perpendicular) = 2m - Epsilon b a mixed state of the photon and positronium exists, called gamma positronium. ESA

N87-15853# Erivan State Univ. (USSR).
OUTPUT ENERGY IN PULSARS **c90**
D. M. Sedrakyan *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 425-427 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20%) oters)

It is shown that when angular velocity of pulsars decreases, the neutron vortices parallel to the axis of rotation move radially to the boundary between star nucleus and crust. This decreases the length of proton vortices in the nucleus, therefore, the magnetic energy of these vortices must release on the edge of npe phase. The full energy output is of the order of 5 times 10 to the 28th to 31st power erg/sec, and the energy release takes place mainly near the equatorial plane. ESA

N87-15854# Abastumani Astrophysical Observatory, Georgia (USSR).
WISPS IN THE CRAB NEBULA
O. V. Chedia, J. G. Lominadze, and E. G. Tsikarishvili *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 429-433 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

Generation of quasistatic magnetic fields in electron plasma in the field of strong electromagnetic wave radiation is considered. A sufficiently large pump wave amplitude is required for the creation of electron relativistic motion. When the condition of parametric resonance is fulfilled, i.e., the pump wave frequency is close to plasma frequency, growth rates of instabilities are calculated, and the maximum value of the generated magnetic field is estimated. The mechanism of the appearance of wisps in the Crab Nebula, and observed features of wisps are explained. ESA

N87-15855# Universidade Tecnica de Lisboa (Portugal). Centro de Electrodinamica.
PULSAR ELECTRODYNAMICS: MAGNETOSPHERES AND RADIATION BY MAGNETOSPHERIC PLASMA **c93**
A. A. daCosta *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 435-439 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

It is shown how the structure of the magnetosphere of a pulsar beyond but close to the speed of light cylinder can explain the gamma and radio radiation. Pulsar magnetosphere charged particles are accelerated by a low frequency electromagnetic field. This field is the superposition of a nondipolar one on a low frequency dipolar field associated with the star. The nondipolar field is generated by coherent effects associated with space charge and current density distributions created by the motion of the particles themselves, and may also explain the radio emission observed, through superluminal beaming of coherent radiation. The highly energetic particles may also radiate incoherently in the X and gamma domain and if they return to the surface of the star they create a quantum magnetosphere. ESA

N87-15856# Milan Univ. (Italy). Dipt. di Fisica.
PAIRS OF PULSARS IN THE DIAGRAM P DOT VERSUS P **c90**
M. Fracassini, P. Maggi, L. E. Pasinetti, and G. Raffaelli *In* ESA Proceedings of the Joint Varenna-Abstumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 441-445 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

Pairs of pulsars (PSR) selected by Vladimirskii (1984) are distributed in 3 groups of PSR found by applying discriminant analysis to the diagram P dot vs P. Evolutive implications of the isochrone t = 1 million yr are discussed. A list of pairs was selected by additional, more restricted criteria, and their position in the diagram P dot vs P is discussed. From these pairs, the

averaged value t = 4.8 million yr for the time interval between the first and second SN outburst in a binary system is obtained, in agreement with the value derived from the pairs of Vladimirskii. These values are slightly higher than that obtained from an evolutive model by Van Den Heuvel (1976). ESA

N87-15857# Pennsylvania State Univ., University Park. Dept. of Astronomy.

ACCRETING PULSARS: SOME RECENT THEORETICAL RESULTS **c90**

P. Meszaros *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma AStrophysics Aug. 1986 p 447-450 (For primary document see N87-15793 07-75)

Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

Relativistic one and two photon Compton scattering in a strong magnetic field was calculated. X-ray pulsar model calculations are presented for the phase-dependent spectrum, pulse shape, cyclotron line profile, degree and angle of linear polarization for the simplest slab and column models of X-ray pulsars. General relativistic effects of light bending are discussed. The results are compared with observations, in particular for Her X-1. This supports slab models, i.e., the observed radiation is being observed preferentially along the magnetic field lines, in the form of a pencil beam. ESA

N87-15858# Abastumani Astrophysical Observatory, Georgia (USSR).

RELATIVISTIC SELF-FOCUSING OF POWERFUL ELECTROMAGNETIC RADIATION IN PLASMA

D. G. Lominadze, E. G. Tsikarishvili, N. S. Erokhin, and A. P. Fadeev *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 453-460 (For primary document see N87-15793 07-75)

Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

The stationary self-focusing of a powerful electromagnetic wave beam due to relativistic nonlinearity near a surface of critical density of an inhomogeneous plasma is considered. This effect may be important in the use of intense lasers to heat or compress plasma, and the plasma surrounding a pulsar, if the pulsar is losing energy by radiation of electromagnetic waves at its rotation frequency. The structure field dynamics at self-focusing is studied by numerical integration of a parabolic nonlinear equation for the electromagnetic wave beam amplitude. ESA

N87-15859# Academy of Sciences (USSR), Moscow. Inst. of Space Research.

ELECTRON NONLINEARITIES AND RAPID WAVE PROCESSES IN COSMIC AND LABORATORY PLASMAS

S. S. Moiseev *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 461-464 (For primary document see N87-15793 07-75)

Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

Plasma processes for which electron nonlinearities are essential are analyzed. Generation of harmonics including conditions for generation of higher harmonics, peculiarities of harmonic generation in magnetoactive plasma; serfatron acceleration of particles in inhomogeneous plasma; and radiation by particles under serfatron acceleration are discussed. ESA

N87-15860# Academy of Sciences (USSR), Novosibirsk. Inst. of Automation and Electrometry.

ON LOW-HYBRID TURBULENCE EXCITED BY ION STREAMS

S. L. Musher, A. M. Rubenchik, and I. Ya Shapiro *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 465-472 (For primary document see N87-15793 07-75)

Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20%) others)

Plasma turbulence excited by ion beams moving across a magnetic field is considered. Turbulence spectra are calculated. The induced scattering cascades the energy into the frequency range close to the low hybrid one. The modulational instability and collapse take place here. The absorbed energy is transferred to ions and electrons. It is shown that power distribution of the accelerated particles occurs. The beam energy is transferred mainly to the fast electrons accelerated up to the energy exceeding the energy of beam ions. ESA

N87-15861# Academy of Sciences (USSR), Novosibirsk. Inst. of Automation and Electrometry.

ACOUSTIC WAVE COLLAPSE EFFECT ON THE STRUCTURE OF COLLISIONLESS SHOCK WAVES IN MAGNETIZED PLASMA

E. A. Kuznetsov and S. L. Musher *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 473-481 (For primary document see N87-15793 07-75)

Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20% others)

The acoustic collapse effect on the structure of collisionless weak shock waves propagating at an angle to magnetic field in the low pressure plasma is considered. In terms of the three-dimensional Kadomtsev-Petviashvili equation, it is determined that an acoustic wave collapse appears under definite conditions in media with positive dispersion. The influence of small amplitude wave radiation on this process is investigated. It is shown that in connection with weak oblique shocks, the collapse of a fast magnetic sound represents a new dissipation mechanism providing energy transfer to ions. Estimates of collisionless shock wave width and effective frequency of energy transfer to ions stipulated by the collapse are given. Comparison with other three-wave nonlinear processes is carried out. It is demonstrated that they are stongly supressed due to exciting of oscillations from the shock wave front. ESA

N87-15862# Abastumani Astrophysical Observatory, Georgia (USSR).

DRIFT VORTICES IN PLASMA MODELLED ON FAST-ROTATING SHALLOW FIELD

R. A. Antonova, B. P. Zhvania, J. G. Lominadze, J. I. Nanobashivili, and V. I. Petniashvili (Institut Atomnoi Energii, Moscow (USSR).) *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 483-488 (For primary document see N87-15793 07-75)

Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

Solitary drift vortices in plasma are modeled by Rossby vortices on a shallow fast-rotating fluid. Anticyclones, cyclones, and cyclone-anticyclone dipoles are obtained. The vortices of large size (gamma about 3r sub R) are always only anticyclones. Vortices with sizes of the order of the Rossby length (gamma about 1.5 r sub R) are cyclones, anticyclones, and dipoles, usually accompanied by small eddies of opposite sign. The countermovement interaction of these structures was realized. The traveling of the dipole vortices across the polar region of the vessel modeling homogeneous plasma conditions is observed. The possibility of anomalous resistance arising as a result of electron deceleration by such vortices in isothermal magnetized plasma is discussed. ESA

N87-15863# Tbilisi State Univ. (USSR). Inst. of Applied Mathematics.

NEGATIVE ENERGY VORTICES IN INHOMOGENEOUS PLASMA

T. D. Kaladze, V. A. Marchenko (Academy of Sciences (USSR), Moscow.), O. A. Pokhotelov, and V. I. Petviashvili (Institut Atomnoi Energii, Moscow (USSR).) *In* ESA Proceedings of the Joint-Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 489-493 (For primary document see N87-15793 07-75)

Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20% others)

The reduced equations of drift-Alfven waves in low-frequency wave packet propagation under large angle to the magnetic field are obtained. Using the solutions, the main parameters of the vortex are estimated. The characteristic rotational velocity and perturbation of the magnetic field in the vortex are obtained. Energy of vortex tubes per length unit is calculated and it is shown that in both cases the vortex energy is negative. This means that in dissipative media the vortex energy in absolute value is growing.
ESA

N87-15864# Tbilisi State Univ. (USSR). Inst. of Applied Mathematics.
ALFVEN VORTICES IN A HOMOGENEOUS PLASMA
G. Aburdzhaniya, V. Lakhin (Institut Atomnoi Energii, Moscow (USSR).), A. Mikhailovskii, and O. Onishchenko (Academy of Sciences (USSR), Moscow.) *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 495-500 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

The nonlinear equations describing shear Alfven vortices in a plasma with Beta greater than me/mi and less than me/mi are obtained (Beta is the ratio of the plasma pressure to the pressure of the magnetic field, me, mi are the electron and ion masses, respectively). These equations are shown to have a dipole vortex solution with space-decreasing amplitude. The peculiarity of the considered vortex solution is the power law of the decrease of the transverse electric potential on the sufficiently far periphery.
ESA

N87-15865# Tbilisi State Univ. (USSR). Inst. of Applied Mathematics.
REVISION OF THE THEORY OF GRADIENT SOLITONS
G. Aburdzhaniya, V. Lakhin (Institut Atomnoi Energii, Moscow (USSR).), A. Mikhailovskii, and O. Onishchenko (Academy of Sciences (USSR), Moscow.) *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 501-503 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

Representations of electron temperature gradient solitons are reviewed. Noncorrectness of previous results of the theory of oblique drift wave solitons is explained together with the theory of short-wavelength drift wave solitons. Nonlinear equations for corresponding types of waves are obtained. ESA

N87-15866# Institut Atomnoi Energii, Moscow (USSR).
VORTEX AND SPIRAL STRUCTURES IN SHEARED FLOWS **c34**
S. V. Bazdenkov, N. M. Morozov, and O. P. Pogutse *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 505-509 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

Gyroscopic effects in sheared flows of rotating shallow water were studied. Global rotation of the medium is shown to affect margin and increment of instability of sheared flow as well as the eigenfunctions. The Coriolis effects destabilize the short wave length perturbations in supersonic sheared flow (tangential discontinuity) and stabilize the long wave perturbations in case of subsonic discontinuity in velocity. Gyroscopic effects are shown to result in cyclon-anticyclone assymetry in the stability problem for sheared flows and in gyroscopic screening, and in the resonance drive of ship waves, when the chain of barriers is moved in a rotating shallow water. The results of a two-dimensional numerical simulation of the experiments with rotating shallow water are discussed. ESA

N87-15867# Academy of Sciences (USSR), Moscow. Inst. of Physics.
INSTABILITY IN THE SYSTEM OF COUNTERSTREAMING RELATIVISTIC PLASMAS
V. P. Silin and V. N. Ursov *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 513-516 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

The instability in the system of counterstreaming cold plasmas in the case of nonrelativistic and ultrarelativistic velocities of streams is studied. Analytic dependencies of instability growth rate on wave vector and on angle between wave vector and stream velocity are obtained. Growing field perturbation polarization is considered. ESA

N87-15868# Academy of Sciences of the Georgian SSR, Tbilisi. Inst. of Physics.
RADIATION OF ION-ACOUSTIC WAVES BY SUPERSONIC SOLITON
I. G. Murusidze, N. L. Tsintsadze, D. D. Tskhakaya, K. H. Spatschek (Duesseldorf Univ. (West Germany).), and P. K. Shukla (Ruhr Univ., Bochum (West Germany).) *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 517-519 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

The radiation of ion-acoustic waves by an electromagnetic wave soliton traveling through a transition layer at supersonic velocity is considered. The transition layer is a plasma density jump blurred over a finite length. It is shown that the soliton loses energy in form of radiated ion acoustic waves during its acceleration when passing over a density jump. The space-time distribution of the acoustic field is investigated. The energy carried away by radiation is estimated. ESA

N87-15869# Abastumani Astrophysical Observatory, Georgia (USSR).
THE NONLINEAR TURBULENT DYNAMO IN THE ACCRETION DISKS OF BLACK HOLES **c69**
G. D. Chagelishvili, J. G. Lominadze, and Z. A. Sokhadze *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 523-529 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

To determine the maximum value which can be reached by the large scale magnetic field in the accretion disk of black holes, the nonlinear equations of the turbulent dynamo, where the sources of field generation are the differential rotation and the helicity of the turbulent pulsations of the medium, are investigated. Using a phenomenological approach, the nonlinear expression of the average helicity of turbulence is deduced. As in objects with strong differential rotation, helicity is affected by an inverse influence of magnetic field. Using the expression for average nonlinear helicity, it is shown that the energy of large scale toroidal magnetic fields in accretion disks of black holes become comparable with the thermal energy of the medium. ESA

N87-15870# Princeton Univ., N. J. Plasma Physics Lab.
THE WRAP UP PROBLEM OF THE GALACTIC MAGNETIC FIELD **c90**
R. Kulsrud *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 531-537 (For primary document see N87-15793 07-75)
(Contract DE-AC02-76CH-03073)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

The hypothesis that the galactic magnetic field is primordial is considered. If only the differential rotation of the galaxy is included, then flux freezing implies the galactic field is wound up 25 times, in contradiction with observations. If it is realized that the field is imbedded only in the ionized component, then rapid ambipolar

diffusion of this component in clouds leads to a very small amount of wrap-up of order one radian. This amount seems consistent with observations. If the torque-induced radial motion of the clouds is included, then the wrap-up is stronger by a factor of two. ESA

N87-15871# Academy of Sciences (USSR), Moscow. Inst. of Applied Mathematics.
MAGNETIC FIELDS OF SPIRAL GALAXIES **c90**
A. A. Ruzmaikin, D. D. Sokoloff (Moscow State Univ. (USSR).), and A. M. Shukurov *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 539-544 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

Observational data and theoretical results on the large-scale magnetic fields in spiral galaxies are reviewed. Observed variations of position angle of polarized radio emission over a galaxy image are discussed. Observational data for our Galaxy are insufficient to decide whether the galactic magnetic field has circular or bisymmetric structure. Estimates and numerical calculations show that bisymmetric magnetic structures observed in many galaxies are the result of excitation of the lowest non axisymmetric magnetic field mode by the turbulent dynamo. The growth time for bisymmetric field in M51 is 300 million yr. In contrast, all non axisymmetric modes decay in M31, in accordance with observations. A source of galactic seed field due to superposition of magnetic loops ejected by supernovae is proposed. ESA

N87-15872# Academy of Sciences (USSR), Leningrad. Inst. of Physics and Technology.
MAGNETIC FIELD GENERATION IN CELESTIAL OBJECTS **c90**
A. Z. Dolginov *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 545-550 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

It is shown that in magnetic field generation in celestial objects, processes different from the dynamo are effective. Meridianal circulations can produce the field in hot O and B stars. The battery process may be effective for the chemically inhomogeneous peculiar Cp stars. The possible inhomogeneities on the Earth core-mantle boundary may be important for terrestrial magnetism. Thermomagnetic instability creates fields in white dwarfs and neutron stars. Mutual induction may lead to field amplification in close binary stellar systems. Along with the relic field and dynamo actions, the above mentioned processes may be important for field generation. ESA

N87-15873# Abastumani Astrophysical Observatory, Georgia (USSR).
GAS ROTATION ABOVE THE GALACTIC DISK **c90**
V. V. Gvaramadze and J. G. Lominadze *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 551-556 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

The galactic disk is modeled by an oblate spheroid with cofocal isodensity surfaces. An explicit analytical expression is found for the angular velocity of the gas outside the disk. Parameters of a three-component mass model of a spiral galaxy are adjusted to give a double-peaked rotation curve (as in the M31 and M81 Galaxies) in a disk. It is shown that the halo gas corotates with the disk at moderate heights, z less than or = 2 kpc. However, farther above the disk the doublepeaked form is washed out. Gas pressure gradient in the halo only weakly changes the rotation curve just above the disk (r less than r disk) and causes the decrease of the rotational velocity beyond the disk edge (r greater than r disk). ESA

N87-15874# Moscow State Univ. (USSR).
CORRELATIVE PROPERTIES OF SELF-EXCITING FLUCTUATIVE MAGNETIC FIELDS **c90**
N. I. Kleeorin (Academy of Pedagogical Sciences of the USSR, Moscow.), A. A. Ruzmaikin (Academy of Sciences (USSR), Moscow.), and D. D. Sokoloff *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 557-561 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20% others)

The correlation function of the magnetic fields excited in a reflectionally symmetrical short correlated turbulent flow is constructed. It is based on an asymptotical solution valid at large magnetic Reynolds numbers Rm. Two magnetic correlation scales appear i.e., l sq root Rm and l quad root Rm in addition to l where l is a basic scale of the turbulence. The results are discussed in application to the Sun and Galaxy. ESA

N87-15875# Abastumani Astrophysical Observatory, Georgia (USSR).
MODEL OF BIMODAL BEHAVIOR OF CYGNUS X-1 **c90**
G. D. Chagelishvili, R. G. Chanishvili, and J. G. Lominadze *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 563-568 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

A model of the accretion disk for Cygnus X-1 is developed. The model explains the existence of two different (high and low) states of the disk depending on accretion rate (M). It is shown that in the absence of thermal convection in the disk middle region, the matter is not able to supply a sufficiently strong large scale magnetic field to the disk inner region, thus, the field has no time to reach appreciable values. Matter accretion proceeds without magnetic field, mainly in accordance with the standard model of accretion, and the high state is realized. At decreasing M, thermal convection, having helical character, appears in the disk middle region. Therefore, large scale magnetic field generation may occur long before matter comes into the disk inner region. Under these conditions, magnetic forces in the maximum energy release region becoming strong generate Raleigh-Taylor instability. Optically thin hot corona are formed, required for the explanation of the power law spectrum of X-ray photons in the low state. ESA

N87-15876# Academy of Sciences, Potsdam (East Germany). Zentralinst. fuer Astrophysik.
ON THE EFFECT OF DIFFERENTIAL ROTATION ON AXISYMMETRIC AND NONAXISYMMETRIC MAGNETIC FIELDS OF COSMIC BODIES **c90**
K.-H. Raedler *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 569-574 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

The behavior of magnetic fields penetrating an electrically conducting fluid body with differential rotation is discussed. Behavior depends crucially on symmetry about the axis of rotation. In the non axisymmetric case, differential rotation enhances dissipation. It symmetrizes the fields during their evolution and is able to screen off their non axisymmetric constituents. The alpha-omega mechanism, unlike the alpha sq-mechanism, can only work with axisymmetric fields. These facts imply that cosmic bodies showing strongly nonaxisymmetric fields should not have strong differential rotation. Consequences concerning planets, Sun, and magnetic stars are indicated. ESA

N87-15877# Department of the Navy, Washington, D. C.
MICROWAVE PULSE COMPRESSION IN DISPERSIVE PLASMAS Patent Application
B. H. Ripin and W. M. Manheimer, inventors (to Navy) Filed 1 Jul. 1986 29 p
(AD-D012426; US-Patent-Appl-SN-880866) Avail: NTIS

HC A03/MF A01 CSCL 09/5

This patent application relates power multiplication of microwave signals and more specifically to pulse compression of high power microwave pulses with a plasma filled waveguide. A plasma-filled waveguide acts as a dispersive element for pulse compression or power multiplication of a frequency chirped microwave signal. In one embodiment, the frequency of the source is chirped near a plasma resonance while the plasma waveguide is held constant in time. In a second embodiment, the source frequency is held fixed while the plasma filled waveguide parameters are varied in time in the vicinity of a plasma resonance. GRA

N87-15878# Naval Research Lab., Washington, D. C.
INTENSE AND SHORT PULSE ELECTRIC FIELD (dc AND MICROWAVE) AIR BREAKDOWN PARAMETERS Memorandum Report, 1 Oct. 1985 - 29 Aug. 1986
A. W. Ali 29 Aug. 1986 34 p
(AD-A172227; NRL-MR-5815) Avail: NTIS HC A03/MF A01 CSCL 20/9

Experimental data for the drift velocity and Townsend ionization coefficient in N2 and O2 are utilized to obtain the ionization rates in N2, O2 and air. These rates are given over a wide range of E/p and differ from those of Felsenthal and Proud at high E/p because of the draft velocity dependence on E/p. Felsenthal and Proud assume a linear dependence on E/p while experimentally, especially at high E/p, this dependence varies as square root of E/p. The developed rates agree well with recent experimental short pulse air breakdown data and are recommended for use in high power microwave (short pulse) air breakdown and propagation calculations. GRA

N87-15879# Naval Research Lab., Washington, D. C.
X-RAY SPECTROSCOPY WITH Z-PINCH NEON PLASMAS
G. Mehlman, P. G. Burkhalter, D. A. Newman, S. J. Stephanakis, and F. C. Young 31 Jul. 1986 25 p
(AD-A172228; NRL-MR-5833) Avail: NTIS HC A02/MF A01 CSCL 20/9

Spatially resolved soft x ray spectra were collected for neon plasmas produced by imploding hollow annular gas puffs with MA level driving currents. The Z pinched imploded plasmas were studied for different rise-time currents produced with or without the use of a plasma erosion opening switch (PEOS). Selected spectrograms were processed and analyzed to obtain absolute energies for the radiation emitted in the Neon 1X and Ne X discrete transitions as well as for total emission over the spectral range 900-1600 eV. The energy radiated for typical shots with or without the PEOS is compared particularly for the predominant alpha transitions of both ions. Also, line widths for the alpha and beta transitions of both ions are determined. X-ray spectroscopy with established x-ray film calibrations and crystal responses has provided absolute intensities for neon K-shell x-rays from gas-jet implosions. Most (90%) of the line radiation is contained in the He-alpha and L-alpha lines of neon. The use of a PEOS to reduce the current risetime and eliminate prepulse produces spectra with less continuu m background and with lines that are narrower by a factor of two. With the PEOS and 1-MA peak driving current, the total radiated energy from 900 to 1600 eV is 1.2 kJ with about 75% of this emission in line radiation. Without the PEOS and with 1.2 MA peak driving current, the total radiated energy in this energy region increases to 2.5 kJ, but only about 45% is in line radiation. GRA

N87-15880# Mission Research Corp., Albuquerque, N. Mex. Laser Plasma Branch.
CONTROL OF ION-VELOCITY DISTRIBUTIONS IN LASER-TARGET INTERACTION EXPERIMENTS
J. Grun, R. Stellingwerf, and B. H. Ripin 6 Oct. 1986 20 p
(DNA Proj. W99-QMXWA)
(AD-A172649; NRL-MR-5652) Avail: NTIS HC A02/MF A01 CSCL 17/8

The width of ion velocity distributions from laser produced plasmas can be controlled experimentally by varying the size of the laser spot. The ion velocity width is determined primarily by whether the ions are mostly in the rarefraction or steady state regime. It is not dominated by the thermal distribution of the ions, as is often assumed. GRA

N87-15881# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
DEVIATION FROM LOCAL THERMODYNAMIC EQUILIBRIUM IN A CESIUM-SEEDED ARGON PLASMA
B. Stefanov, L. Zarkova, and A. Veefkind Nov. 1985 25 p Sponsored by Netherlands Organization for Pure Scientific Research
(EUT-85-E-152; ISBN-90-6144-152-8; ISSN-0167-9708; ETN-86-98708) Avail: NTIS HC A02/MF A01

A model to analyze deviations from local thermodynamic equilibrium (LTE) in cesium seeded argon plasmas was developed. A four level model of cesium is employed. Overpopulations of the ground state and the first excited state as well as the corresponding reduction of the electron density are calculated for cylindrical discharge structures by solving stationary rate equations. Numerical results indicate that in a large regime of plasma conditions the LTE assumption is valid for electron temperatures >3000 K. ESA

N87-15248# Essen Univ. (West Germany).
SPACE APPLICATIONS OF BASIC PLASMA THEORY
K. H. Spatchek *In* DFVLR Colloquium about Joint Projects within the DFVLR/ISRO Cooperation Jul. 1986 p 105-112 Sponsored by DFVLR and Indian Space Research Organization (For primary document see N87-15240 07-12)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne, West Germany DM 46

76 SOLID-STATE PHYSICS

includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N87-15882* National Aeronautics and Space Administration. Pasadena Office, Calif.
METHOD FOR GROWING LOW DEFECT, HIGH PURITY CRYSTALLINE LAYERS UTILIZING LATERAL OVERGROWTH OF A PATTERNED MASK Patent
Andrew D. Morrison (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) and Taher Daud, inventors (to NASA) Issued 16 Sep. 1986 6 p Filed 28 Feb. 1985 Supersedes N85-30933 (23 - 19, p 3374) Division of US-Patent-4,522,661, US-Patent-Appl-SN-507624, filed 24 Jun. 1983 Sponsored by NASA
(NASA-Case-NPO-15813-2; US-Patent-4,612,072; US-Patent-Appl-SN-706564; US-Patent-Class-148-175; US-Patent-Class-29-576-E; US-Patent-Class-29-576-J; US-Patent-Class-29-576-W; US-Patent-Class-29-575; US-Patent-Class-29-578; US-Patent-Class-148-174) Avail: US Patent and Trademark Office CSCL 20B

A method for growing a high purity, low defect layer of semiconductor is described. This method involves depositing a patterned mask of a material impervious to impurities of the semiconductor on a surface of a blank. When a layer of semiconductor is grown on the mask, the semiconductor will first grow from the surface portions exposed by the openings in the mask and will bridge the connecting portions of the mask to form a continuous layer having improved purity, since only the portions overlying the openings are exposed to defects and impurities. The process can be iterated and the mask translated to further improve the quality of grown layers.

Official Gazette of the U.S. Patent and Trademark Office

N87-15883*# National Aeronautics and Space Administration. Pasadena Office, Calif.
TAILORABLE INFRARED SENSING DEVICE WITH STRAIN LAYER SUPERLATTICE STRUCTURE Patent Application
Li-Jen Cheng, inventor (to NASA) Filed 28 Aug. 1986 19 p
(Contract NAS7-918)

(NASA-Case-NPO-16607-1; NAS 1.71:NPO-16607-1; US-Patent-Appl-SN-901114) Avail: NTIS HC A02/MF A01 CSCL 20L

An infrared photodetector is formed of a heavily doped p-type Ge sub x Si sub 1-x/Si superlattice in which x is pre-established during manufacture in the range 0 to 100 percent. A custom tailored photodetector that can differentiate among close wavelengths in the range of 2.7 to 50 microns is fabricated by appropiate selection of the alloy constituency value, x, to establish a specific wavelength at which photodetection cut-off will occur. NASA

N87-15884# Oslo Univ. (Norway). Inst. of Physics.
BASIC THEORY OF DIAMETER CONTROL IN CZOCHRALSKI GROWTH USING THE MELT-WEIGHING TECHNIQUE
T. H. Johansen Apr. 1986 30 p
(DE86-752529; OUP-86-09) Avail: NTIS HC A03/MF A01

The unconfined crystal growth in the Czochralski configuration is recognized as a process which is quite dependent upon successful control of the shape determining conditions. Attention is focused on the meniscus region, and its relevance to the crystal diameter behaviour is discussed. The dynamic stability of the configuration is analyzed according to the Surek criterion. The system is shown to be inherently stable at normal growth conditions if the thermal impedance of the meniscus is taken into account. General difficulties associated with small diameter growth are pointed out. Reference is made to various growth monitoring arrangements and the melt-weighing method is described in great detail. Assuming uniform growth with a flat interface the exact relation between the force experienced by a weighing cell and the growth parameters during both stationary and non-stationary conditions is derived. Researchers apply the Tsivinskii meniscus approximation and discuss quantitatively the errors made by neglecting non-stationary contributions to the balance signal, and the consequencies this has for control around a stationary state. DOE

N87-15885# Hypress, Inc., Elmsford, N.Y.
DEVELOPMENT OF NbN JOSEPHSON JUNCTION TECHNOLOGY Final Report, 14 Sep. 1985 - 15 Jun. 1986
M. Radparvar 24 Jul. 1986 21 p
(Contract N00014-85-C-0064)
(AD-A171067) Avail: NTIS HC A02/MF A01 CSCL 20/12

A novel process suitable for fabrication of superconducting circuitry based on the all refactory material NbN is described. In this process, and in-situ trilayer film composed of NbN/MgO/NbN is used to fabricate Josephson tunnel junctions. Reactive ion etching processes are used to delineate devices and pattern insulators and metallizations. Fabricated junctions have yielded good tunneling characteristics with reasonable current density uniformity and reproducibility. Devices with gap voltages close to 3mV have been achieved for high quality junctions (Vm > 20 mV). In addition to the trilayer, there are two wiring layers, two resistor depositions, and two insulation layers, constituting a full NbN based fabrication technology. Using this process, we fabricated and successfully tested thin film DC SQUID and time domain reflectometer (TDR) circuits. Preliminary measurements suggest that the critical temperature of these circuits is well within the operating temperature of commercial two-stage closed cycle refrigerators. Author (GRA)

N87-15886# State Univ. of New York, Buffalo. Dept. of Chemistry.
LASER-LINEWIDTH EFFECTS ON THE PHOTON-PHONON CONVERSION RATE AT A GAS-SOLID INTERFACES
Henk F. Arnoldus and Thomas F. George Jul. 1986 22 p
(Contract N00014-86-K-0043)
(AD-A171469; TR-12) Avail: NTIS HC A02/MF A01 CSCL 20/2

An atom, bounded to the surface of a crystal, absorbs photons from a strong incident laser field and subsequently emits phonons into the solid. This paper studies the influence of the laser linewidth of this photon phonon conversion process. The appearance of coherences obscures the interpretation of the equation of motion in terms of transition rates and prohibits the derivation of a master equation in the transient region. The absorbed energy from the driving field, which is assumed to be resonant with a set of two levels only, results from the work done by the external field on the transition dipole. In the steady state, the energy absorption from the radiation field equals the energy emission in the phonon field. It is shown that in this long time limit the coherences can be expressed in terms of the populations, and hence the system is again described by a master equation. Specific aspects of the finite laser bandwidth are pointed out. GRA

N87-15887# Cornell Univ., Ithaca, N.Y. Lab. of Atomic and Solid State Physics.
INTERATOMIC INTERACTIONS IN SOLIDS: AN EFFECTIVE MEDIUM APPROACH
M. Manninen 25 Aug. 1986 38 p
(Contract N00014-82-K-0576)
(AD-A171518; TR-26) Avail: NTIS HC A03/MF A01 CSCL 20/12

The description of the total energy of a solid in terms of the effective medium theory has been studied. Using the density functional theory an exact symmetric formula is presented for describing the total energy in terms of embedding energies of individual atoms. Different approximate formulae are derived and compared to the conventional pair potential representation, to the model of Gordon and Kim, and to the semiempirical embedded atom scheme of Daw and Baskes. The theory is applied to estimate the pair potential in rare gases He, Ne, and Ar, and the cohesive properties of Al, metal. A fair agreement with the experimental results is obtained. GRA

N87-15888# Department of the Army, Washington, D. C.
LASER-INDUCED CHEMICAL VAPOR DEPOSITION OF GERMANIUM AND DOPED-GERMANIUM FILMS Patent Application
Ann E. Stanley, inventor (to Army) Filed 6 Aug. 1986 36 p
(AD-D012462; US-Patent-Appl-SN-893837) Avail: NTIS HC A03/MF A01 CSCL 20/12

Germanium and doped-germanium polycrystalline films are formed using a photolytic CO2 laser-induced chemical vapor deposition method. Germanium being transparent to IR light makes the production of high purity polycrystalline germanium and doped-germanium films from starting compounds of germane, ethylgermane diethylgermane, and triethylgermane ideally adapted to the laser induced infrared radiation provided by the tunable, continuous-wave CO2 laser which delivers infrared laser radiation in the range of 10.4 or 9.4 micrometers. The compounds which produce germanium in usable quantity are germane, ethylgermane and diethylgermane. Triethylgermane produces germanium in a quantity usable as a dopant. The products identified on irradiation of germane are germanium and hydrogen. Conversion rates on the order of 86% are readily obtained. On irradiation of diethylgermane and ethylgermane, ethylene, germane, germanium and hydrogen are produced. Germanium films doped with cadmium and aluminum are successfully produced by the irradiation of germane mixtures containing dimethylcadmium or trimethyl aluminum, respectively. aluminum, respectively. GRA

N87-15889# California Univ., Berkeley. Dept. of Physics.
JOSEPHSON EFFECT DETECTORS OF MICROWAVE AND FAR INFRARED RADIATION Final Technical Report, 1 Dec. 1984 - 31 May 1986
31 May 1986 4 p
(Contract N00014-85-C-0233)
(AD-A171539) Avail: NTIS HC A02/MF A01 CSCL 09/5

This contract terminates nearly ten years of Navy support for the invention and development of superconducting quasiparticle heterodyne receivers for millimeter wavelength radiation. Quantum effects such as mixer conversion gain and noise comparable to the limit set by the Heisenberg uncertainty principle have been experimentally observed. Mixer response at 36 and 90 GHz has been studied as a function of parameters such as RF and IF embedding impedance, local oscillator power, bias voltage, junction I-V curve, and operating temperature. Comparisons have been

made with SIS mixer theory and good agreement has generally been found. These mixers are being used full time in heterodyne receiver systems at several radio astronomical observatories. They are the lowest noise millimeter wave receivers available today. GRA

N87-15890# Brown Univ., Providence, R. I. Dept. of Chemistry.
PREPARATION AND CHARACTERIZATION OF SEVERAL 2-4-V2 STANNITE SINGLE CRYSTALS
He-Sheng Shen, Guang-Qing Yao, Robert Kershaw, Kirby Dwight, and Aaron Wold 5 Sep. 1986 20 p Submitted for publication
(Contract N00014-85-K-0177)
(AD-A172238; TR-2) Avail: NTIS HC A02/MF A01 CSCL 20/12

The ternary compounds ZnSiP2 and ZnGeP2 are semiconductors which crystallize with the chalcopyrite structure (space group I42d). ZnSiP2 has been reported to melt at 1250C and single crystals were obtained from a molten zinc or tin flux as well as by chemical vapor transport. There has been no report of crystal growth from the melt. Single crystals of ZnSiP2, ZnGeP2 and ZnGeP(1.8)As(.2) have been grown by several techniques and their electronic and optical properties were compared. For ZnSiP2 there are marked absorption bands at 10 and 11.5 um, and at 13 um for ZnGeP2. Upon substitution of 10 mole percent of arsenic for phosphorus, the latter band is red-shifted by 0.3 um. This composition represents the limit of substitution of arsenic for phosphorus in this structure. GRA

N87-15891# North Carolina Univ., Chapel Hill. Dept. of Chemistry.
SYNTHESIS AND CHARACTERIZATION OF NEW LOW-DIMENSIONAL METAL COMPLEX CONDUCTORS Final Report, 1 May 1976 - 30 Apr. 1986
William E. Hatfield 1 Oct. 1986 12 p
(Contract N00014-76-C-0816)
(AD-A172659) Avail: NTIS HC A02/MF A01 CSCL 07/4

This research program was devoted to the synthesis and characterization of new transition metal compounds which had the potential of high electrical conductivities. Since band formation and electrical conductivity is enhanced by strong intermolecular interactions fully and partially oxidized metallomacrocyclic complexes were synthesized and characterized. Electrochemical methods were developed for crystal growth to overcome solubility problems which led to mixed phase products in earlier studies. These principles were extended to lanthanide complexes of phthalocyanine (HPcLaPc; Pc = phthalocyanine, La = lanthanide). These sandwich compounds contain an acidic proton which is thought to serve as a bridge between successive PcLadPc units. In some cases the phthalocyanine ring has an unpaired electron in its pi system. In this manner, strong intertechniques led to the preparation of many new compounds. A series of cationic copper complex-TCNQ charge transfer complexes, some of which exhibit high electrical conductivities, has been prepared and characterized. Other members of the series are currently under study. Hemiporphyrazine and other chain compounds with high electrical conductivities were studied, along with a series of organometallic charge transfer compounds with TCNQ. GRA

N87-15892# Indiana Univ., Bloomington. Dept. of Physics.
STUDY OF TRANSIENT PHONON DYNAMICS Final Report, 1 Jul. 1983 - 30 Jun. 1986
W. E. Bron 30 Aug. 1986 16 p
(Contract DAAG29-83-K-0091)
(AD-A172691; ARO-20446/17-PH) Avail: NTIS HC A02/MF A01 CSCL 20/12

The research program during the past three year grant period has been quite successful in devising new, and adapting existing, laser based techniques to the study of short and ultra-short duration laser induced transient dynamics. For the most part, work has concentrated on the dynamics of excited, nonequilibrium phonon distributions in semiconductors and in ionic solids. The excitation brings the solids well away from thermal equilibrium. It has been the author's contention that phonon dynamics and phonon transport can be investigated in greater detail by nonequilibrium techniques than by thermal equilibrium techniques as, e.g., thermal conductivity measurements. The results obtained so far offer an excellent opportunity for the expansion of existing methods and facilities to new areas of research. GRA

N87-15893# California Univ., Los Angeles. Dept. of Physics.
CHARACTERIZATION OF INFRARED PROPERTIES OF LAYER SEMICONDUCTORS Annual Scientific Report, 1 May 1984 - 31 Aug. 1985
Rubin Braunstein 8 Aug. 1986 128 p
(Grant AF-AFOSR-0169-83)
(AD-A172692; AFOSR-86-0861TR) Avail: NTIS HC A07/MF A01 CSCL 07/4

Infrared wavelength modulation absorption spectroscopy was employed in the spectral range of 0.3-1.45 eV to study deep level impurities in undoped semi-insulating GaAs grown by the liquid encapsulated Czochralski technique. The sensitivity of the measurements allows us to give credence to changes in absorption at levels of .001/cm. The measurements reveal two resonant type peaks with fine structures near 0.39 and 0.40 eV as well as plateaus and thresholds at higher energy. The absorption band at 0.37 eV is interpreted as due to the intra center transition between levels of accidental iron impurity. The absorption band near 0.40 eV can be annealed out by heat treatment and is characterize as belonging to a structural multi level defect complex. Photo induced transient spectroscopy technique also reveal out annealable level at 0.42 eV. Raman backscattering was employed to measure the shift in the frequency of unscreened and screened phonon plasma mode in GaAs in a study of the change in the surface depletion layer widths due to various surface treatments. A technique of photomixing was employed to measure the drift velocities in the hot carrier small distance regimes in Coallium Arsenide. GRA

N87-15894# Xerox Palo Alto Research Center, Calif.
SELECTIVE HYDROGEN PASSIVATION OF OXYGEN-RELATED THERMAL-DONOR CLUSTERS IN SILICON
N. M. Johnson, S. K. Hahn, and H. J. Stein 1986 6 p Presented at the 14th International Conference on Defects in Semiconductors, Paris, France, 18 Aug. 1986 Prepared in cooperation with Siltec Corp., Mountain View, Calif. and Sandia National Labs., Albuquerque, N. Mex.
(Contract DE-AC04-76DP-00789)
(DE86-014718; SAND-86-0850C; CONF-860895-2) Avail: NTIS HC A02/MF A01

Experimental results are presented which demonstrate hydrogen passivation of oxygen-related thermal donor defects in n-type silicon. Techniques for manipulating the distribution of cluster size are described, and evidence is presented for a degree of selectivity in the passivation of thermal-donor clusters. DOE

N87-15766# Osaka Univ. (Japan). Dept. of Electrical Engineering.
TRANSMISSION ELECTRON MICROSCOPE AND PHOTOLUMINESCENCE STUDIES OF ZnS CRYSTALLINE FILMS GROWN BY LOW-PRESSURE MOCVD
Yoichi Kawakami, Tsunemasa Taguchi, and Akio Hiraki *In its* Technology Reports of the Osaka University, Volume 36, Nos. 1844-1864 Oct. 1986 p 335-343 (For primary document see N87-15754 07-70)
Avail: NTIS HC A09/MF A01

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; theoretical physics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N87-15895# International Centre for Theoretical Physics, Trieste (Italy).

SPONTANEOUS COMPACTIFICATION OF EXTRA DIMENSIONS IN ELEVEN-DIMENSIONAL QUANTUM GRAVITY
Nguyen van Hieu Jul. 1985 36 p
(DE86-702620; IC-85/99) Avail: NTIS (US Sales Only) HC A03/MF A01

The reduction of the eleven-dimensional pure gravity theory to a field theory in the four-dimensional Minkowski space-time by means of the spontaneous compactification of the extra dimensions is investigated. The contribution of the quantum fluctuations of the eleven-dimensional second rank symmetric tensor field to the curvatures of the space-time and the compactified space of the extra dimensions are calculated in the one-loop approximation. It is shown that there exist the values of the cosmological constant such that the resulting four-dimensional theory is self-consistent. DOE

N87-15896# Sao Paulo Univ. (Brazil). Inst. de Fisica.
SCALAR FIELDS IN KASNER-TYPE SPACE-TIMES: TIME DEPENDENT VACUUM EXPECTATION VALUES
H. Fleming and V. L. R. Silveira 1985 11 p
(DE86-702622; IFUSP-P-521) Avail: NTIS (US Sales Only) HC A02/MF A01

Non-constant vacuum expectation values of scalar fields in curved space-time generate important physical consequences. It is shown to be the case for a class of spatially homogeneous and anisotropic metrics. DOE

N87-15897# International Centre for Theoretical Physics, Trieste (Italy).
EFFECTIVE EINSTEINIAN GRAVITY FROM POINCARE GAUGE FIELD THEORY
P. Baekler and E. W. Mielke Oct. 1985 8 p Previously announced as A86-26264
(DE86-702874; IC-85/260) Avail: NTIS (US Sales Only) HC A02/MF A01

The Poincare gauge theory of gravity should apply in the microphysical domain. Here we investigate its implications for macrophysics. Weakly self double dual Riemann-Cartan curvature is assumed throughout. It is shown that the metrical background is then determined by Einstein's field equations with the Belinfante-Rosenfeld symmetrized energy-momentum current amended by spin squared terms. Moreover, the effective cosmological constant can be reconciled with the empirical data by absorbing the corresponding constant curvature part into the dynamical torsion of recently found exact solutions. Macroscopically this extra torsion remains undetectable. DOE

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N87-15898# National Academy of Public Administration, Washington, D. C.
NASA: THE VISION AND THE REALITY
Erasmus H. Kloman Oct. 1985 66 p
(OP-5) Avail: NTIS HC A04/MF A01

The complex of aspirations and national priorities lying behind the original vision of the civilian space program and how that program has fared in the real world of politics centering on Washington were explored. The programmatic evolution of NASA and some of the key administrative and management concepts developed to govern the operation of the agency were examined. In gathering information, both former and present NASA officials were interviewed as well as knowledgable individuals outside the agency. B.G.

N87-15384# International Maritime Satellite Organization, London (England).
INSTITUTIONAL ASPECTS: INMARSAT
In ESA Proceedings of an ESA Workshop on Land Mobile Services by Satellite Sep. 1986 p 107-108 (For primary document see N87-15361 07-32)
Avail: NTIS HC A08/MF A01

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information management; information storage and retrieval technology; technical writing; graphic arts; and micrography.

For computer documentation see *61 Computer Programming and Software.*

N87-15899 Florida State Univ., Tallahassee.
THE FACILITATION OF DIRECT SEARCHING OF ONLINE SERVICES BY THE END USER IN ACADEMIC LIBRARIES Ph.D. Thesis
Betty Douglas Paulk 1986 282 p
Avail: Univ. Microfilms Order No. DA8616899

Four hundred eighty-seven online search librarians in comprehensive and doctoral institution libraries in the United States were surveyed about end user online searching. Of the 431 respondents (89 percent), only 10.4 percent or forty-five of the responding libraries allow end users direct access to conduct their own online searches. The majority of librarians indicated that they are offering instructional programs in online searching. Upon closer examination of the purpose of this instruction, it was determined that only a small percentage of the instructional programs are actually teaching the user to conduct their own searches. While the majority of the online search librarians believed that end user searching was inevitable, there was a feeling of ambiguity concerning this development. The majority of the librarians believed that online search librarians would assume a more challenging role as a result of end user searching. And yet, the librarians did question whether or not end users were going to want to conduct their own searches and the role the librarian should assume in encouraging end users to conduct their own searches and in training end users to perform these online searches. Dissert. Abstr.

N87-15900 Pittsburgh Univ., Pa.
THE IMPACT ON THE OCLC INTERLIBRARY LOAN SUBSYSTEM ON ARL LIBRARIES Ph.D. Thesis
Ingrid T. M. Glasco 1985 194 p
Avail: Univ. Microfilms Order No. DA 8617156

The impact of OCLC and its Interlibrary Loan Subsystem (ILL Subsystem) on interlibrary loan services among libraries of the Association of Research Libraries (ARL) since its introduction in 1979 was investigated. Five areas are studied: productivity; organization and staffing; patterns of interlibrary borrowing and lending; attitudes toward OCLC and the ILL Subsystem; and use of the OCLC Online Union Catalog in interlibrary load services. The major data gathering instrument was a questionnaire which was mailed to 77 ARL institutions participating in the OCLC ILL Subsytem as of February 1, 1984. Sixty-eight questionnaires were returned. Interviews were conducted with library directors and interlibrary loan librarians in three selected libraries. Dissert. Abstr.

N87-15901# Massachusetts Inst. of Tech., Cambridge. Lab. for Computer Science.
CORRECTNESS CONDITIONS FOR HIGHLY AVAILABLE REPLICATED DATABASES Interim Report
Nancy Lynch, Barbara Blaustein, and Michael Siegel Jun. 1986

45 p
(Contracts N00014-83-K-0125; N00014-85-K-0168; F30602-84-C-0112; DAAG29-84-K-0058; Grant NSF DCR-83-02391)
(AD-A171427; MIT/LCS/TR-364) Avail: NTIS HC A03/MF A01 CSCL 09/2

Correctness conditions are given which describe some of the properties exhibited by highly available distributed database systems such as the SHARD (System for Highly Available Replicated Data) system currently being developed at Computer Corporation of America. This system allows a database application to continue operation in the face of communication failures, including network partitions. A penalty is paid for this extra availability: the usual correctness conditions, serializability of transactions and preservation of integrity constraints, are not guaranteed. However, it is still possible to make interesting claims about the behavior of the system. The kinds of claims which can be proved include bounds on the costs of violation of integrity constraints, and fairness guarantees. In contrast to serializability's all-or-nothing character, this work has a continuous flavor: small changes in available information lead to small perturbations in correctness conditions. This work is novel because there has been very little previous success in stating interesting properties which are guaranteed by nonserializable systems. Author (GRA)

N87-15902# Defense Technical Information Center, Alexandria, Va.
SYSTEMATIC CORPORATE PLANNING AT DTIC (DEFENSE TECHNICAL INFORMATION CENTER) Final Report
Georgene C. Chastain and R. R. Parris Aug. 1986 18 p
(AD-A171525; DTIC/TR-86/19) Avail: NTIS HC A02/MF A01 CSCL 05/1

The Defense Technical Information Center (DTIC) has recently committed itself to a long-range corporate planning process. The purpose of this technical report is to describe this corporate planning process, to document those steps DTIC has taken to implement the corporate plans, and to present lessons learned for use in future planning endeavors. Author (GRA)

N87-15903# Defense Technical Information Center, Alexandria, Va.
SUBJECT CATEGORIZATION GUIDE FOR DEFENSE SCIENCE AND TECHNOLOGY
Oct. 1986 281 p
(AD-A172650; DTIC/TR-86/16) Avail: NTIS HC A13/MF A01 CSCL 05/2

This guide is an extensive revision of the COSATI Subject Category List (DOD Modified) AD 624000. It provides a basis for the subject grouping of scientific and technical reports used by the Defense Technical Information Center (DTIC). It is used primarily as a standardized mechanism for defining areas of need-to-know in the distribution of information about DOD-supported technologies. GRA

N87-15246# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
A FLIGHT DEMONSTRATION PROGRAM ON SPACE DATA HANDLING
J. Beck *In its* Colloquium about Joint Projects within the DFVLR/ISRO Cooperation Jul. 1986 p 83-92 (For primary document see N87-15240 07-12)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne, West Germany DM 46

N87-15510# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
THE CREATION OF AN ENVIRONMENTAL INFORMATION SYSTEM FOR THE EUROPEAN COMMUNITY
David Rhind, Barry Wyatt, David Briggs, and Jim Wiggins *In its* Contributions to Geodesy, Photogrammetry, and Cartography, Series 2, No. 44 1986 p 147-157 (For primary document see N87-15498 07-43)
Avail: NTIS HC A10/MF A01

N87-15513# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
PROBLEMS IN ESTABLISHING AND UPDATING A DIGITAL CARTOGRAPHIC DATA BASE AT THE MILLIONTH SCALE
Ingo Wilski *In its* Contributions to Geodesy, Photogrammetry, and Cartography, Series 2, No. 44 1986 p 193-211 (For primary document see N87-15498 07-43)
Avail: NTIS HC A10/MF A01

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW, POLITICAL SCIENCE AND SPACE POLICY

Includes NASA appropriation hearings; aviation law; space law and policy; international law; international cooperation; and patent policy.

N87-15904# Committee on Commerce, Science, and Transportation (U. S. Senate).
NASA AUTHORIZATIONS, FISCAL YEAR 1987
Washington GPO 1987 500 p Hearings before the Subcommittee on Science, Technology and Space of the Committee on Commerce, Science and Transportation, 99th Congress, 2d Session, 20 Mar.; 10, 16, 23 Apr.; 8 May; 5 Aug. 1986
(GPO-61-975) Avail: Subcommittee on Science, Technology and Space

NASA's FY-1987 Aeronautics and Transatmospherics Research and Technology budget requests are examined. The Advanced Turboprop Program, rotorcraft programs, the X-wing Program, long-distance supersonic cruise research, scramjet engine development, and aerospace plane technology development are addressed. M.G.

N87-15905# Committee on Science and Technology (U. S. House).
H.R. 4316 AND H.R. 3112: INVENTIONS IN OUTER SPACE
Washington GPO 1986 97 p Hearing on H.R. 4316 and H.R. 3112 before the Subcommittee on Space Science and Applications of the Committee on Science and Technology, 99th Congress, 2d Session, No. 148, 12 Aug. 1986
(GPO-64-526) Avail: Subcommittee on Space Science and Applications

Comments and prepared statements concerning two pieces of legislation, H.R. 4316 and H.R. 3112, are presented. These bills amend title 35 of the United States Code and the National Aeronautics and Space Act with respect to the applicability of the U.S. patent law to activities which occur in outer space. Topics of major concern include the clarification of jurisdiction, the relationship between U.S. federal agencies and their inventor contractors, and international cooperative agreements. Representatives from NASA, the Patent and Trademark Office, and private industry presented testimony. M.G.

N87-15906# Committee on Appropriations (U. S. Senate).
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT, AND CERTAIN INDEPENDENT AGENCIES APPROPRIATIONS FOR FISCAL YEAR 1987, PART 2
Washington GPO 1986 553 p Hearings on H.R. 5313 before the Committee on Appropriations, 99th Congress, 2nd Session, 25 Feb., 5 and 12 Mar., 15 May, and 16 Sep. 1986
(S-Hrg-99-707-Pt-2; GPO-57-570) Avail: Subcommittee of the Committee on Appropriations

Budget appropriations for FY-87 are discussed for: Office of

Revenue Sharing; National Credit Union; Office of Science and Technology Policy; National Science Foundation; Federal Emergency Management Agency; Environmental Protection Agency; and National Aeronautics and Space Administration. For individual titles, see N87-15907 through N87-15908.

N87-15907# Committee on Appropriations (U. S. Senate).
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
In its Department of Housing and Urban Development, and Certain Independent Agencies Appropriations for Fiscal Year 1987, Part 2 1986 p 917-983 (For primary document see N87-15906 07-84)
Avail: Subcommittee of the Committee on Appropriations

Funding was discussed for space flight control and data communications for costs associated with restoring to flight status the shuttle transportation system and to maintain the production capibility for a replacement orbiter. Reliability and quality assurance, redesign of the solid rocket boosters, and safety factors were also discussed. B.G.

N87-15908# Committee on Appropriations (U. S. Senate).
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
In its Department of Housing and Urban Development, and Certain Independent Agencies Appropriations for Fiscal Year 1987, Part 2 1986 p 985-1065 (For primary document see N87-15906 07-84)
Avail: Subcommittee of the Committee on Appropriations

The budget request, along with its necessary revisions, will assist in the initiation of procurement for a replacement orbiter and inertial upper-stage airborne support equipment. Also included are funds to augment activities directed toward resolution of space shuttle sytem anomalies and initiation of development of the Space Station. B.G.

N87-15909# Center for Naval Analyses, Alexandria, Va. Naval Warfare Operations Div.
IMPLICATIONS OF THE STRATEGIC DEFENSE INITIATIVE FOR ABM TREATY
George R. Schneiter Feb. 1986 17 p
(Contract N00014-83-C-0725)
(AD-A171145; CNA-PP-441) Avail: NTIS HC A02/MF A01 CSCL 15/3

SDI is a current emphasis of the US strategic program, joining a considerable build-up in US strategic offensive forces. The US defense budget has now begun to reflect increases in research on technologies applicable to a space-based defense. And the United States has enlisted the endorsement of her NATO allies for at least the research portion of SDI. This article will examine the effect of this new direction in US defense policy on strategic arms control. It will focus particularly on questions raised for the 1972 Anti-ballistic Missile (ABM) Treaty, in the eyes of many the principal lasting achievement of the era of detente. This Treaty, which bans a territorial defense against strategic ballistic missiles and severely constrains other ABM activities, is the only one of the SALT agreements still legally in force. The article first reviews the strategic forces and programs of the United States and Soviet Union, with emphasis on defensive forces. It then addresses the background and current status of the ABM Treaty. Finally, it identifies and discusses the critical issues with regard to the future of the ABM Treaty. GRA

N87-15252# Indian Space Research Organization, Trivandrum.
POSSIBLE AREAS OF COLLABORATION BETWEEN DFVLR AND ISRO IN THE FIELDS OF STRUCTURES AND MATERIALS
V. Gowariker *In* DFVLR Colloquium about Joint Projects within the DFVLR/ISRO Cooperation Jul. 1986 p 143-148 (For primary document see N87-15240 07-12)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne, West Germany DM 46

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see also *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N87-15910# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A DECISION SUPPORT SYSTEM FOR SPACE TECHNOLOGY TRADEOFFS: A MICROCOMPUTER APPLICATION M.S. Thesis
Bruce G. Schinelli 13 Dec. 1985 179 p
(AD-A172379; AFIT/GOR/OS/85D-17) Avail: NTIS HC A09/MF A01 CSCL 12/2

The Air Force Space Technology Center is responsible for defining goals, tasks and priorities for the military R & D effort in space. To accomplish this task, the Space Technology Center has developed the Military Space Systems Technology Plan (MSSTP). Past research has shown that the research and development portfolio selection process does not lead to any easy quantitative analysis solution. The very nature of research and development issues leads to a more direct involvement in the process by the decision-maker. The concept of decision support systems (DSS) is tailored toward unquantitative, decision intensive problems. The objective of this research was to begin implementation of a DSS for the Space Technology Center. Research indicated, however, that traditional implementation strategies may have serious drawbacks to the traditional implementation approaches, a new implementation strategy was formed. This strategy is called the pilot approach. This research develops the new strategy, begins its implementation and performs an analysis on the system after beginning the implementation process at the Space Technology Center. Author (GRA)

N87-15911# Naval Postgraduate School, Monterey, Calif.
ADAPTIVE MODELING OF THE DYNAMICS OF AUTONOMOUS LAND VEHICLES M.S. Thesis
James H. Kessler, IV Jun. 1986 120 p
(AD-A172404) Avail: NTIS HC A06/MF A01 CSCL 13/6

This study examines the feasibility of identifying the dynamic parameters of autonomous land vehicles. Initially a simulation study is done using a simplified vehicle model and three different identification schemes. The parameter estimator which has the best characteristics is then used on an improved model to determine if this approach can be used to obtain the parameters of multi-wheeled vehicles. GRA

88 SPACE SCIENCES (GENERAL)

No abstracts in this category.

89 ASTRONOMY

Includes radio, gamma-ray, and infrared astronomy, and astrometry.

N87-15912 Ohio State Univ., Columbus.
A SPECTRAL ANALYSIS OF RV TAURI VARIABLES Ph.D. Thesis
Glenn Michael Wahlgren 1986 243 p
Avail: Univ. Microfilms Order No. DA8618861

Members of the RV Tauri class of pulsating variable stars have been observed spectroscopically with the Ohio State University Image Dissector Scanner on the 72-inch Perkins Telescope, and photometrically with the B and V filters of the Johnson UBV system and the Wing eight-color narrow-band near-infrared system. The heterogeneity of the class is evident from various observed properties. For eight variables TiO absorption was detected, and ten variables displaced hydrogen emission lines at some phase. Special classifications were assigned by comparison with standard star spectra. Color excesses were formed for those variables for which photometric and spectroscopic data were obtained within a few days of each other. No attempt was made to distinguish between the interstellar and circumstellar contributions to the color excess. The spectra obtained at a resolution of 2.5 A were fit by synthetic spectra, generated with the MOOG synthetic program, in order to determine the atmospheric parameters effective temperature, gravity, turbulent velocity, and metallicity. The range in metallicity found is quite extensive, with (Fe/H) between -0.3 and -1.7, and may reflect a mixture of stellar populations or masses. The atmospheric parameters resulting from the spectrum fits were used to determine absolute magnitudes which were compared to those predicted from the RV Tauri period-luminosity relation. Dissert. Abstr.

N87-15913 Oklahoma Univ., Norman.
INFRARED AND CCD PHOTOMETRIC STUDY OF SPIRAL GALAXIES Ph.D. Thesis
Ioanna Manousoyannaki 1986 232 p
Avail: Univ. Microfilms Order No. DA8617413

Infrared J(1.2 microns), H(1.6 microns) and K (2.2 microns) photometry is presented for a subsample of galaxies with morphological types of Sc and Sb of the sample types Sc and Sb of the sample by Rubin et al. and one edge-on spiral galaxy. After an overview of the science of infrared photometry accurate photometric magnitudes are derived via curves of growth which have been computed using a compiled catalog of galaxies observed in the infrared. The photometric data is used to derive mass to light ratio distribution and the colors for each galaxy. Several correlations of photometric and dynamical quantities are examined and discussed as integral properties of the two morphological types. The main result of this analysis is that the mass to H-light ratio is independent of radius and H-luminosity and is a good measure of the stellar component of the galaxy. Emphasis is placed on the Tully-Fisher, absolute magnitude vs. log (rotational velocity), relation and its application to derive distances of galaxies. Dissert. Abstr.

N87-15914 New Mexico State Univ., Las Cruces.
SEEING EFFECTS AND THEIR CALIBRATION FOR ASTRONOMICAL SPECKLE INTERFEROMETRY Ph.D. Thesis
Julian Charles Christou 1985 173 p
Avail: Univ. Microfilms Order No. DA8616559

The effects of seeing upon the techniques for recovery of high spatial resolution information are discussed. The need for calibration of the seeing to avoid incorrect interpretation of the reduced data is presented. A method which allows resolved and unresolved objects observed in variable seeing conditions to be reduced with corresponding seeing is presented and analyzed. This technique also allows study of the seeing statistics of the atmosphere. These measurements lead to observation constraints for the use of speckle interferometry as well as a refined observational protocol. The effects of non-isoplanatism, especially when applied to the imaging technique of speckle holography, are also discussed along with measurements of the spatial frequency dependent isoplanatic parameter. It is shown that the degree of isoplanicity is dependent upon spatial frequency requirements and the telescope being used. An imaging technique which appears to be seeing self-calibrating is presented. The resolved red supergiant Alpha Orionis is studied using this self-calibrating imaging technique. Diameter measurements at six different wavelengths yield a consistent stellar radius when different limb darkening is taken into account. Images of Gamma Orionis (unresolved) are used as the point spread functions for the images. Dissert. Abstr.

N87-15915*# Alabama Univ., Birmingham. Dept. of Physics.
THEORETICAL ANALYSIS OF SEGMENTED WOLTER/LSM X-RAY TELESCOPE SYSTEMS Final Report
D. L. Shealy and S. H. Chao 15 Aug. 1986 81 p
(NASA Order H-78747B)
(NASA-CR-178986; NAS 1.26:178986) Avail: NTIS HC A05/MF A01

The Segmented Wolter I/LSM X-ray Telescope, which consists of a Wolter I Telescope with a tilted, off-axis convex spherical Layered Synthetic Microstructure (LSM) optics placed near the primary focus to accommodate multiple off-axis detectors, has been analyzed. The Skylab ATM Experiment S056 Wolter I telescope and the Stanford/MSFC nested Wolter-Schwarzschild x-ray telescope have been considered as the primary optics. A ray trace analysis has been performed to calculate the RMS blur circle radius, point spread function (PSF), the meridional and sagittal line functions (LST), and the full width half maximum (PWHM) of the PSF to study the spatial resolution of the system. The effects on resolution of defocussing the image plane, tilting and decentrating of the multilayer (LSM) optics have also been investigated to give the mounting and alignment tolerances of the LSM optic. Comparison has been made between the performance of the segmented Wolter/LSM optical system and that of the Spectral Slicing X-ray Telescope (SSXRT) systems. Author

N87-15916*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
EXPERIMENTAL EVALUATION OF THE RING FOCUS TEST FOR X-RAY TELESCOPES USING AXAF'S TECHNOLOGY MIRROR ASSEMBLY, MSFC CDDF PROJECT NO. H20 Final Report
D. E. Zissa and D. Korsch Oct. 1986 15 p
(NASA-TM-86570; NAS 1.15:86570) Avail: NTIS HC A02/MF A01 CSCL 03A

A test method particularly suited for X-ray telescopes was evaluated experimentally. The method makes use of a focused ring formed by an annular aperture when using a point source at a finite distance. This would supplement measurements of the best focus image which is blurred when the test source is at a finite distance. The telescope used was the Technology Mirror Assembly of the Advanced X-ray Astrophysis Facility (AXAF) program. Observed ring image defects could be related to the azimuthal location of their sources in the telescope even though in this case the predicted sharp ring was obscured by scattering, finite source size, and residual figure errors. Author

N87-15842# Simferopol M. V. Frunze State Univ. (USSR).
REDISCUSSION OF THE MODEL ATMOSPHERE OF VEGA
E. I. Terez *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 347-350 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15869# Abastumani Astrophysical Observatory, Georgia (USSR).
THE NONLINEAR TURBULENT DYNAMO IN THE ACCRETION DISKS OF BLACK HOLES
G. D. Chagelishvili, J. G. Lominadze, and Z. A. Sokhadze *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 523-529 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

90 ASTROPHYSICS

Includes cosmology; celestial mechanics; space plasmas; and interstellar and interplanetary gases and dust.
For related information see also *75 Plasma Physics*.

N87-15917 California Univ., Berkeley.
STRUCTURE OF THE COMA CLUSTER OF GALAXIES

Ph.D. Thesis
Leon Jay Schipper 1985 219 p
Avail: Univ. Microfilms Order No. DA8610202

This study is based primarily upon a sample of 1722 galaxies in the Coma cluster observed by Abell. Researchers compare Abell's observations of the inner part of the Coma cluster (within 75 arc-min) with those of several other observers, and prepare a catalogue of observations from several observers. They test the distribution of galaxies for irregularities, finding marginal evidence that there are some clumps of galaxies in certain regions and magnitude ranges. However, they find that axially symmetric bumps in the radial density distribution of galaxies are not significant. They then fit the projected spatial distribution of galaxies in order to determine the core radius. They find that the value of the core radius is larger than that found by most previous authors, and it increases with increasing galaxy magnitude. This finding implies that a degree of mass segregation exists in the cluster. Finally, they determined the spatial luminosity density at the center of the cluster. They then discuss the impact of the inclusion of nonmembers on the analysis. They discuss different methods of determining membership in the cluster and correcting for the effect of nonmembers upon the observations. They find that the clumped nature of the background makes it difficult to determine the membership of the cluster by a smooth subtraction of background galaxies. However, the uncertain background subtraction is not the reason for the increase in the core radius with magnitude. Dissert. Abstr.

N87-15918 Dartmouth Coll., Hanover, N.H.
AUTOMATIC PARAMETERIZATION AND ANALYSIS OF STELLAR ATMOSPHERES: A STUDY OF THE DA WHITE DWARFS Ph.D. Thesis
Robert Kenneth McMahan 1986 150 p
Avail: Univ. Microfilms Order No. DA8617750

A method for automatically calculating the atmospheric parameters of hydrogen-rich degenerate stars from low resolution spectra is advanced and then applied to 53 DA white dwarfs. All data were taken using the Mark 2 spectrograph on the McGraw-Hill 1.3 m telescope and cover the spectral range wavelength 4100 to 7000 at a resolution of 8 Angstroms. The model grid was generated using the atmosphere code LUCIFER; which contained over 275 synthetic spectra extending from 6,000 to 100,000 K in effective temperature and 7.4 to 9.3 in log g. Dissert. Abstr.

N87-15919 Texas Univ., Austin.
THE TRANSFORMATION FROM PLANETARY NEBULA NUCLEUS TO WHITE DWARF: A SEISMOLOGICAL STUDY OF STELLAR METAMORPHOSIS Ph.D. Thesis
Steven Daniel Kawaler 1986 175 p
Avail: Univ. Microfilms Order No. DA8618503

The existence of several pulsating hot degenerates provides the opportunity to study this transitory stage of stellar evolution with the techniques available from the pulsation theory. A 0.40 to 0.95 solar mass stellar model from the planetary nebula nucleus (PNN) phase to the cooling white dwarf phase using a variety of techniques solve the equations of linear adiabatic nonradial oscillations for these models. Rates of period change can be used to probe the mass, structure, composition, and energy loss mechanisms of these degenerates. Also reported are preliminary results of fully nonadiabatic pulsation calculations for models of PNN. It is suggested that if hydrogen-deficient PNNs contain helium burning shells, then they should show pulsation with these periods. Dissert. Abstr.

N87-15920 North Carolina Univ., Chapel Hill.
MAIN SEQUENCE PHOTOMETRY OF GLOBULAR CLUSTERS Ph.D. Thesis
Richard Tobias Inman 1986 262 p
Avail: Univ. Microfilms Order No. DA8618357

Photometry through the level of the main sequence turn-off has been accomplished for eight globular clusters which lie within a wide range of galactocentric distances. Measurement of magnitudes was done using photographic, photoelectric and charge-coupled device (CCD) detectors. A variety of reduction methods was needed to cope with data from the various instruments. One of the clusters (AM-4) proved to be a member of the group of loose, Palomar-like objects. Resultant cluster ages, obtained from isochrone fits, cannot strongly constrain current theories concerning the timescale for the development of the globular cluster system. Dissert. Abstr.

N87-15921*# National Aeronautics and Space Administration, Washington, D.C.
ASTROBLEMES ON TRAPP ROCK: STRUCTURAL FEATURES AND DIFFERENCES FROM IMPACT STRUCTURES ON OTHER TARGETS
V. I. Feldman, Yu. V. Mironov, V. R. Melikhov, B. A. Ivanov, and A. T. Bazilevskiy Aug. 1986 16 p Transl. into ENGLISH from Meteoritika (USSR), no. 44, 1985 p 139-145 Original language document was announced in IAA as A86-30944 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88484; NAS 1.15:88484) Avail: NTIS HC A02/MF A01 CSCL 03B

The paper briefly characterizes the two known terrestrial meteorite craters on trapp rock: (1) Lonar, India (diameter 1,8 km) and Logancha, USSR (diameter 20 km). The features these craters have in common are identified, and their differences from problems on other types of targets are indicated. The probable reasons for these differences are discussed. Author

N87-15922*# Boston Univ., Mass. Dept. fo Geology.
METEORITIC BASALTS: THE NAKHLITES, THEIR PARENTAL MAGMAS, COOLING RATES, AND EQUIVALENTS ON EARTH Semiannual Progress Report, Jan. 1987
Allan H. Treiman Jan. 1987 9 p
(Grant NAG9-168)
(NASA-CR-180071; NAS 1.26:180071) Avail: NTIS HC A02/MF A01 CSCL 03B

Field study in northern Ontario was planned to compare cumulate rocks reported in the literature with the nakhlites in order to study the crystallization rates of the nakhlites and their possible geological settings. Experimental studies have progressed slowly because of the demands of the field work and teaching. The furnace is fully functional, and its thermocouple and oxygen sensor cells are functional and calibrated. B.G.

N87-15923# Minnesota Univ., Minneapolis. Dept. of Physics.
TOPICS IN COSMOLOGY AND PARTICLE PHYSICS
K. A. Olive Oct. 1985 46 p
(Contract DE-AC02-83ER-40105)
(DE86-014830; DOE/ER-40105/543) Avail: NTIS HC A03/MF A01

In these three lectures, some of the major topics are reviewed which concern both particle physics and cosmology. In the first lecture, a general overview of the standard cosmological Big Bang model is given, and Big Bang nucleosynthesis is briefly gone over as well as Big Bang baryosynthesis. In the second lecture, the inflationary model is reviewed with particular emphasis on supersymmetry. In the final lecture, the dark matter problems which confront cosmology today and their demands on elementary particle physics are discussed. DOE

N87-15796# Academy of Sciences (USSR), Moscow. Inst. of Space Research.
EQUILIBRIUM AND STABILITY OF GALAXIES IN BINARY SYSTEMS
G. S. Bisnovatyi-Kogan *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 21-29 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15799# Academy of Sciences (USSR), Moscow. Inst. of Space Research.

COSMIONS AND GALAXY FORMATION
T. A. Kahniashvili and V. N. Lukash *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 41-45 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15800# Academy of Sciences (USSR), Leningrad. Central Astronomical Observatory.
MAGNETIC FIELDS OF HOT STARS: OBSERVATION METHODS AND RESULTS
Yu. N. Gnedin and N. A. Silantiev *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 47-53 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15801# Milan Univ. (Italy). Dept. of Physics.
BLAZARS: BEAMED OR NOT BEAMED
A. Treves *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 55-59 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15814# Academy of Sciences (USSR), Moscow. Inst. of Space Research.
THE CRITICAL IONIZATION VELOCITY PHENOMENON IN ASTROPHYSICS
A. A. Galeev and I. Ch. Chabibrachmanov *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 129-136 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15836# Academy of Sciences (USSR), Moscow. Inst. of Space Research.
MASS LOADING AND MHD TURBULENCE IN THE SOLAR WIND/COMET INTERACTION REGION
A. A. Galeev, R. Z. Sagdeev, V. D. Shapiro, V. I. Shevchenko, and K. Szego (Hungarian Academy of Sciences, Budapest.) *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 307-315 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15847# Academy of Sciences (USSR), Leningrad. Inst. of Physics and Technology.
TWO-PHOTON ANNIHILATION RADIATION IN STRONG MAGNESTIC FIELD
A. D. Kaminker, G. G. Pavlov, and P. G. Mamradze *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 393-398 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN. and NO (+20% others)

N87-15848# Academy of Sciences (USSR), Moscow. Inst. of Physics.
BOUND ELECTRON-POSITRON PAIR CREATION BY GAMMA-QUANTA IN SUPERSTRONG MAGNETIC FIELD OF PULSARS
A. E. Shabad and V. V. Usov *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 399-404 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15852# Academy of Sciences (USSR), Moscow. Inst. of Terrestrial Magnetism, Ionosphere and Radiations.
GAMMA-POSITRONIUM IN THE MAGNETOSPHERE OF A PULSAR
L. B. Lenison and V. N. Oraevsky *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 421-424 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15853# Erivan State Univ. (USSR).
OUTPUT ENERGY IN PULSARS
D. M. Sedrakyan *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 425-427 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20%) oters)

N87-15856# Milan Univ. (Italy). Dipt. di Fisica.
PAIRS OF PULSARS IN THE DIAGRAM P DOT VERSUS P
M. Fracassini, P. Maggi, L. E. Pasinetti, and G. Raffaelii *In* ESA Proceedings of the Joint Varenna-Abstumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 441-445 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15857# Pennsylvania State Univ., University Park. Dept. of Astronomy.
ACCRETING PULSARS: SOME RECENT THEORETICAL RESULTS
P. Meszaros *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 447-450 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15870# Princeton Univ., N. J. Plasma Physics Lab.
THE WRAP UP PROBLEM OF THE GALACTIC MAGNETIC FIELD
R. Kulsrud *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 531-537 (For primary document see N87-15793 07-75) (Contract DE-AC02-76CH-03073)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15871# Academy of Sciences (USSR), Moscow. Inst. of Applied Mathematics.
MAGNETIC FIELDS OF SPIRAL GALAXIES
A. A. Ruzmaikin, D. D. Sokoloff (Moscow State Univ. (USSR).), and A. M. Shukurov *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 539-544 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15872# Academy of Sciences (USSR), Leningrad. Inst. of Physics and Technology.
MAGNETIC FIELD GENERATION IN CELESTIAL OBJECTS
A. Z. Dolginov *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 545-550 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15873# Abastumani Astrophysical Observatory, Georgia (USSR).
GAS ROTATION ABOVE THE GALACTIC DISK
V. V. Gvaramadze and J. G. Lominadze *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 551-556 (For primary

document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15874# Moscow State Univ. (USSR).
CORRELATIVE PROPERTIES OF SELF-EXCITING FLUCTUATIVE MAGNETIC FIELDS
N. I. Kleeorin (Academy of Pedagogical Sciences of the USSR, Moscow.), A. A. Ruzmaikin (Academy of Sciences (USSR), Moscow.), and D. D. Sokoloff *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 557-561 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15875# Abastumani Astrophysical Observatory, Georgia (USSR).
MODEL OF BIMODAL BEHAVIOR OF CYGNUS X-1
G. D. Chagelishvili, R. G. Chanishvili, and J. G. Lominadze *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 563-568 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15876# Academy of Sciences, Potsdam (East Germany). Zentralinst. fuer Astrophysik.
ON THE EFFECT OF DIFFERENTIAL ROTATION ON AXISYMMETRIC AND NONAXISYMMETRIC MAGNETIC FIELDS OF COSMIC BODIES
K.-H. Raedler *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 569-574 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights. For spacecraft design or space stations see *18 Spacecraft Design, Testing and Performance.*

N87-15924 Rice Univ., Houston, Tex.
PLASMA OUTFLOW AND SUPERROTATION IN THE JOVIAN MAGNETOSPHERE DEDUCED FROM VOYAGER OBSERVATIONS Ph.D. Thesis
Marc Rotan Hairston 1986 146 p
Avail: Univ. Microfilms Order No. DA8617447

Magnetometer and plasma science data from the Voyager 1 and Voyager 2 encounters of Jupiter are combined with earlier theoretical analysis to determine the total mass outflow rate and radial bulk velocity of the magnetospheric plasma in the Jovian plasma sheet, as well as the height integrated Pedersen conductivity of the Jovian ionosphere. The analysis requires accurate determination of the orientation of the plasma sheet using magnetometer data surrounding the plasma sheet crossing points. This analysis has been applied to fifteen crossings of the Jovian plasma sheet on both the day side and the night side. Results obtained from this analysis are believed to be accurate within a factor of two, and confirm previous order-of-magnitude estimates. Evidence of an enhanced outflow of plasma in the active hemisphere of System III longitude is observed on the dayside. On the night side, evidence of plasma inflow and superrotation is seen in the inactive hemisphere. These two observations lend support to the corotating-convection model of plasma transport in the Jovian magnetosphere. Dissert. Abstr.

N87-15925 Brown Univ., Providence, R. I.
UNSTABLE DEFORMATION IN LAYERED MEDIA: APPLICATION TO PLANETARY LITHOSPHERES Ph.D. Thesis
Maria Theresa Zuber 1986 156 p
Avail: Univ. Microfilms Order No. DA8617649

Described are theoretical models in which observed length scales of deformation on a planetary surface are used to make inferences about the mechanical properties, style of deformation and nature of forces acting on the lithosphere. Each model represents an application of linearized hydrodynamic stability theory in which the lithosphere is treated as a strength and density stratified continuum in a state of horizontal extension or compression. The first paper, Extension of Continental Lithosphere: A Model for Two Scales of Basin and Range Deformation, demonstrates that short and long wavelengths of deformation may develop in response to unstable extension of the strong upper crust and upper mantle regions of the lithosphere, respectively. The second paper, Rifting by Ductile Lithosphere Extension: A Dynamic Model for Rift Morphology, analyzes the dynamic contribution to rift morphology of flow induced by a necking instability in an extending lithosphere. It is shown that deformation which nucleates about an initial thickness perturbation in the strong layer of an extending lithosphere results in a rift-like structure, with a width related to the dominant wavelength of the extensional instability. The third paper, Unstable Compression of Oceanic Lithosphere: An Analysis of Intraplate Deformation in the Central Indian Basin, shows that the wavelength of intraplate deformation observed in the Indian Ocean can provide constraints on the strong layer strength of the lithosphere. Dissert. Abstr.

N87-15926*# National Aeronautics and Space Administration, Washington, D.C.
GEOLOGICAL-MORPHOLOGICAL DESCRIPTION OF THE LAKSHMI PLANUM (PHOTOMAP OF THE VENUSIAN SURFACE SHEET B-4)
A. A. Pronin Jan. 1987 22 p Transl. into ENGLISH from Astronomicheskiy Vestnik (Moscow, USSR), v. 20, no. 2, 1986 p 83-98 Original language document was announced in IAA as A86-44701 Transl. by The Corporate Word, Inc., Pittsburgh, Pa. (Contract NASw-4006)
(NASA-TM-88495; NAS 1.15:88495) Avail: NTIS HC A02/MF A01 CSCL 03B

The Lakshmi Planum and its surrounding area (together comprising a single structure) are described in morphological terms on the basis of Venera 15 and 16 photomap data. Plume ascent from the planetary interior and subsequent horizontal spreading represent the underlying mechanisms behind structural formation: folding and/or imbricating accompany these processes. In effect, the Laksmi structure can be regarded as a local spreading center. Its structural dimensions attest to the role that asthenospheric currents played in its formation. Author

N87-15927*# State Univ. of New York, Stony Brook. Dept. of Earth and Space Sciences.
CHEMISTRY OF THE OUTER PLANETS: INVESTIGATIONS OF THE CHEMICAL NATURE OF THE ATMOSPHERE OF TITAN Progress Report, 15 Dec. 1984 - 14 Dec. 1985
Thomas W. Scattergood 22 Oct. 1985 12 p
(Contract NCC2-311)
(NASA-CR-180072; NAS 1.26:180072) Avail: NTIS HC A02/MF A01 CSCL 03B

It is clear from the experiments that a variety of complex organic models can be produced by lightning in a Titan-like gas mixture. The dominant products were found to be acetylene and hydrogen cyanide, with smaller amounts of many other species. Any aerosol produced by lightning inititated process will consist of a complex mixture of organic compounds, many of which should easily be identified by pyrolytic gas chromatography. Work will continue to expand the data base of molecules produced by lightning and other processes in order to assist in the design of appropriate analytical instruments for the upcoming Saturn/Titan mission and any other planetary probes. B.G.

N87-15928# Iowa Univ., Iowa City. Dept. of Physics and Astronomy.

SPORADIC NARROWBAND RADIO EMISSIONS FROM URANUS Progress Report
W. S. Kurth, D. A. Gurnett, and F. L. Scarf May 1986 34 p
(Contract N00014-85-K-0404)
(AD-A170947; U-OF-IOWA-86-24) Avail: NTIS HC A03/MF A01 CSCL 03/2

Among several different types of radio emissions discovered at Uranus during the Voyager 2 encounter in January 1986 is a very sporadic, bursty signal which consists of very narrow bands lying in the frequency range from about 3 to 10 kHz. The bursty emission was virtually undetectable from the dayside portion of the Voyager 2 trajectory but was observed out to beyond 300 RU during the outbound trajectory through the pre-dawn sector. While the narrowband tones making up this emission are reminiscent of escaping continuum radiation observed near Earth, Jupiter and Saturn, the Uranian signals show large amplitude variations on time scales of a second suggesting a very different type of generation mechanism. Author (GRA)

N87-15815# Academy of Sciences (USSR), Moscow. Inst. of Space Research.
SPONTANEOUS RECONNECTION AT THE BOUNDARIES OF PLANETARY MAGNETOSPHERES
M. M. Kuznetsova and L. M. Zeleny *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 137-146 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15820# Universidad Nacional Autonoma de Mexico, Ensenada. Inst. de Geofisico.
MODELS OF THE VENUS IONOSPHERIC FLOW
H. Perez-de-Tejada *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 169-173 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

For related information see *93 Space Radiation.*

N87-15929 Rice Univ., Houston, Tex.
THE TWO STATE STRUCTURE OF THE SOLAR WIND AND ITS INFLUENCE UPON PROTON TEMPERATURES IN THE INNER HELIOSPHERE. OBSERVATIONS OF HELIOS 1 AND HELIOS 2 Ph.D. Thesis
Ramon E. Lopez 1985 116 p
Avail: Univ. Microfilms Order No. DA8618890

The two state structure of the solar wind and its influence upon proton temperatures is examined. Results from Helios spacecraft data are interpreted in light of several theoretical models of the solar wind. In particular, it is found that the interplanetary heating of the protons observed by Helios is consistent with models that rely on extended deposition of energy and momentum in the form of Alfvenic waves. Analysis shows that between 4-10% of the time the data are consistent with two fluid models which do not include extended deposition of energy and momentum. For the rest of the data, the magnetic fluctuations are analyzed and it is found that there is dissipation of wave energy. Calculations show that the heating required by the protons can be accounted for by the apparent dissipation of Alfvenic wave energy. The relationships of temperature to velocity, to number density, and to momentum flux are also examined and are found to be consistent with a bifurcation of the solar wind based upon Alfven waves. A qualitative scenario for the generation of the two state solar wind wherein all the energy for the solar wind comes from convection in the Sun is discussed. Dissert. Abstr.

N87-15805# Academy of Sciences (USSR), Moscow. Inst. of Terrestrial Magnetism, Ionosphere and Radiowave Propagation.
OSCILLATIONS AND WAVES IN SUNSPOTS
Yu D. Zhugzada *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 85-89 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15806# Kharkov State Univ. (USSR).
ENERGY DISSIPATION AND CONVECTIVE MOTORS IN THE LOCAL MHD-RESONANCE REGIONS IN SOLAR CHROMOSPHERE
V. P. Vasilyev, V. I. Lapshin, and K. N. Stepanov *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 91-93 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15807# Academy of Sciences (USSR), Moscow. Inst. of Nuclear Research.
HELIOSEISMOLOGY AND THE INTERNAL STRUCTURE OF THE SUN
E. A. Gavryuseva *In* ESA Proceedings of the joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 95-100 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris FF 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15808# Leningrad (A. A. Zhdanov) State Univ. (USSR).
ION ACCELERATION IN SOLAR FLARES ENRICHED BY HELIUM-3 AND IN GAMMA-RAY LINE FLARES
L. G. Kocharov and G. A. Kovaltsov *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 101-104 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15809# Abastumani Astrophysical Observatory, Georgia (USSR).
PROPAGATION OF NONLINEAR MODULATED ALFVEN WAVES IN SPICULES AND MAGNETIC FLUX TUBES
A. D. Pataraya and B. B. Chargeishvili *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 105-107 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15811# Toyama Univ. (Japan). Faculty of Engineering.
PREFLARE ACCELERATION BY MAGNETIC TRAPPING IN SHEARING ARCADES
J. Sakai, T. Tajima (Texas Univ., Austin.), and R. Sugihara (Nagoya Univ. (Japan).) *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 113-116 (For primary document see N87-15793 07-75)
(Grant NSF ATM-85-06646)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15812# Academy of Sciences, Potsdam (East Germany). Zentralinst. fuer Astrophysik.
TOPOLOGICAL STABILITY OF MAGNETIC FIELDS IN SPATIAL DOMAINS WITH BOUNDARIES AND FINITE-LENGTH FIELD LINES
N. Seehafer *In* ESA Proceedings of the Joint Varenna-Abastumani

International School and Workshop on Plasma Astrophysics Aug. 1986 p 117-120 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15813# Indian Inst. of Science, Bangalore.
SOME INTERESTING FEATURES IN THE DRIFT PAIR PHENOMENA OF SOLAR DECAMETRIC RADIATION
G. Thejappa, N. Gopalswamy, C. N. Sastry, and M. G. Aubier *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 121-125 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15817# Tbilisi State Univ. (USSR). Inst. of Geophysics.
THE PROBLEM OF THE MHD FLOW NEAR STAGNATION POINT OF THE CURRENT SHEET
A. G. Khantadze and Z. A. Kereselidze *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 151-154 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15818# Polish Academy of Sciences, Warsaw. Space Research Center.
MAGNETOSPHERIC TAILS IN THE SOLAR PLANETARY SYSTEM
W. Macek and S. Grzedzielski *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 155-161 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15819# Academy of Sciences, Berlin (East Germany). Inst. of Cosmic Research.
A FLUID SIMULATION OF THE AMPTE NEUTRAL GAS RELEASE IN THE SOLAR WIND
K. Sauer and K. Baumgaertel *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 163-168 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N87-15930 Pittsburgh Univ., Pa.
THE ANGULAR SIZES OF FAINT RADIO SOURCES AND THEIR IMPLICATIONS FOR COSMOLOGY Ph.D. Thesis
Paul Henry Coleman 1985 132 p
Avail: Univ. Microfilms Order No. DA8617147

The angular sizes of extragalactic radio sources were studied with the Very Large Array (VLA) as functions of redshift and flux density in hopes of obtaining information on cosmological parameters and source size evolution. Bright sources are not problematically larger than models predict. Dissert. Abstr.

N87-15931*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
EXOSA STUDY OF EXTENDED X-RAY EMISSION AROUND ISOLATED GALAXIES EX56B IDENTIFICATION AND SPECTRA OF BRIGHT X-RAY SOURCES AT HIGH GALACTIC LATITUDE Final Report, 1 Apr. 1985 - 30 Nov. 1986
Daniel A. Schwartz Jan. 1987 5 p
(Grant NAG8-522)
(NASA-CR-180099; NAS 1.26:180099) Avail: NTIS HC A02/MF A01 CSCL 03B

The EXOSAT observations confirmed the identification and extended nature of PKS 2345-35. It gave a good 2 to 10 keV X-ray spectrum and a detailed spatial profile indicating asymmetry of the structure. In the high galactic latitidue investigation, the BL Lac object identified with the HEAO-1 source 1430+423 was detected, and the first X-ray spectrum was obtained. Several simulataneous observations of H0323+022 were obtained over a broad range of electromagnetic spectrum. Studies of luminous active galactic nuclei have given significant information on the spectrum of the quasar PKS 0558-504. In a study of Southern sky cataclysmic variables, the EXOSAT was used to determine the X-ray spectrum and search for periodicities in two objects. Studies of complete identifications have revealed that X-ray sources in two high galactic latitude fields are stars, and therefore are to be excluded from the Piccinotti extragalactic sample. Only one Piccinotti source remains to be identified. B.G.

N87-15831# Academy of Sciences (USSR), Leningrad. Inst. of Physics and Technology.
COSMIC RAY ARCHAEOLOGY, SOLAR ACTIVITY AND SUPERNOVA EXPLOSIONS
G. E. Kocharov *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 259-270 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15832# Academy of Sciences (USSR), Yakutsk. Institute of Cosmophysical Research and Aeronomy.
THE ROLE OF COSMIC RAYS IN SUPERNOVAE SHOCK DYNAMICS
E. G. Berezhko *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 271-278 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15833# Academy of Sciences (USSR), Moscow. Inst. of Terrestrial Magnetism, Ionosphere and Radio Wave Propagation.
HYDRODYNAMICS OF INTERSTELLAR MEDIUM INCLUDING COSMIC RAYS
V. S. Ptuskin *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 279-286 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15834# Academy of Sciences (USSR), Moscow. Inst. of Physics.
PROBLEMS OF COSMIC RAY ACCELERATION IN GIANT MOLECULAR CLOUDS
V. A. Dogiel, A. V. Gurevich, Ya N. Istomin, G. S. Sharov, and K. P. Zybin *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 287-296 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15835# Academy of Sciences (USSR), Moscow. Inst. of Space Research.
INJECTION MECHANISM FOR THE COSMIC RAY ACCELERATION BY SHOCKS
A. A. Galeev, R. Z. Sagdeev, and V. D. Shapiro *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 297-305 (For primary document see N87-15793 07-75)

Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15839# Sydney Univ. (Australia). School of Physics.
MAGNETOSPHERIC AND SOLAR RADIATION FROM LOSS-CONE DRIVEN TEST INSTABILITIES
D. B. Melrose and R. G. Hewitt *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 331-336 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15845# Academy of Sciences (USSR), Gorky. Inst. of Applied Physics.
RADIATION TRANSFER AND RADIATION PRESSURE ON PLASMA BY MAGNETIC DEGENERATES
V. V. Zheleznyakov and A. A. Litvinchuk *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 375-381 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15849# Abastumani Astrophysical Observatory, Georgia (USSR).
THE GENERATION OF RADIO WAVES IN THE INHOMOGENEOUS MAGNETIC FIELD OF THE PULSAR MAGNETOSPHERE
A. Z. Kazbegi, G. Z. Machabeli, and G. I. Melikidze *In* ESA Proceedings of the Joint Varenna-Abastumanii International School and Workshop on Plasma Astrophysics Aug. 1986 p 405-410 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15850# Academy of Sciences (USSR), Moscow. Inst. of Physics.
ELECTRODYNAMICS OF INHOMOGENEOUS RELATIVISTIC ELECTRON-POSITRON PLASMA AND RADIO EMISSION OF PULSARS
V. S. Beskin, A. V. Gurevich, and Ya. N. Istomin *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 411-415 (For primary document see N87-15793 07-75)
Avail: NTIS HC A25/MF A01; ESA, Paris F F 150 ($20) Member States, AU, CN, and NO (+20% others)

N87-15851# Abastumani Astrophysical Observatory, Georgia (USSR).
INVESTIGATION OF SUBPULSE DRIFT IN PULSARS MEANING THE CORIOLIS FORCE AND INHOMOGENEITIES
A. D. Pataraya, B. B. Chargeishvili, and M. Z. Zedginidze (Tbilisi State Univ. (USSR).) *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 417-419 (For primary document see N87-15793 07-75)
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N87-15855# Universidade Tecnica de Lisboa (Portugal). Centro de Electrodinamica.
PULSAR ELECTRODYNAMICS: MAGNETOSPHERES AND RADIATION BY MAGNETOSPHERIC PLASMA
A. A. daCosta *In* ESA Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics Aug. 1986 p 435-439 (For primary document see N87-15793 07-75)
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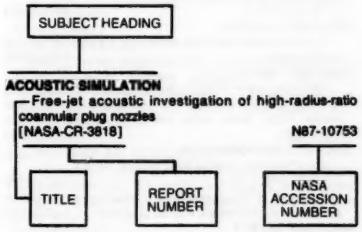

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A

ABSORBERS (MATERIALS)
Stibine filter for antimonial lead acid batteries
[AD-D012427] N87-15419
ABSORPTION SPECTRA
Remote detection of OH N87-15536
ABSORPTION SPECTROSCOPY
OH radical measurements by optical absorption spectroscopy N87-15530
OH detection by Ford Motor Company N87-15534
Ultrasensitive detection of atmospheric trace gases using frequency modulation spectroscopy N87-15535
Tunable-diode laser absorption spectrometry N87-15543
AC GENERATORS
Research for electric energy systems
[DE86-012716] N87-15435
ACCELERATION STRESSES (PHYSIOLOGY)
G-tolerance standards for aircrew training and selection
[AD-A170441] N87-15685
ACCELEROMETERS
Small, self-contained aircraft fatigue data recorder
[AD-A172400] N87-15207
ACCIDENT INVESTIGATION
Aircraft accident reports: Brief format, US civil and foreign aviation, issue number 7 of 1985 accidents
[PB86-916921] N87-15195
Aircraft accident reports: Brief format, US civil and foreign aviation, issue number 6 of 1985 accidents
[PB86-916920] N87-15196
ACCIDENT PREVENTION
Overview of major hazards. Part 2: Source term; dispersion; combustion; blast, missiles, venting; fire; radiation; runaway reactions; toxic substances; dust explosions N87-15323
ACCIDENTS
Investigation of the Challenger accident, volume 1
[GPO-64-295] N87-15256
Multiphase problems related to safety studies in the process industries N87-15324
ACCRETION DISKS
Equilibrium and stability of galaxies in binary systems N87-15796
Radiative acceleration of clouds near compact accreting objects — active galactic nuclei N87-15843
The nonlinear turbulent dynamo in the accretion disks of black holes N87-15869
Model of bimodal behavior of Cygnus X-1 N87-15875
ACCURACY
Non-reference analysis of rotational accuracy with nanometer resolution on ultraprecision spindle N87-15770
ACOUSTIC EMISSION
Detecting and monitoring crack growth in austenitic and ferritic steels
[DE86-014348] N87-15299
Research in nonlinear acoustics
[AD-A172634] N87-15777
Ultrasonic measurements research: Improved acoustic emission methods
[AD-A172726] N87-15778
ACOUSTIC MEASUREMENT
Detecting and monitoring crack growth in austenitic and ferritic steels
[DE86-014348] N87-15299
Development of instrumentation to measure sound speed and flow direction in dusty flow fields
[AD-A171050] N87-15453
Human real time perception in noise
[AD-A172374] N87-15699
Ultrasonic measurements research: Improved acoustic emission methods
[AD-A172726] N87-15778
ACOUSTIC PROPERTIES
Research in nonlinear acoustics
[AD-A172634] N87-15777
ACOUSTIC SCATTERING
Ultrasonic scattering and nondestructive evaluation of defects
[AD-A172258] N87-15494
Effects of strong diffraction on the focusing and scattering of acoustic waves
[AD-A171220] N87-15776
ACOUSTIC VELOCITY
Development of instrumentation to measure sound speed and flow direction in dusty flow fields
[AD-A171050] N87-15453
ACOUSTICS
Noise susceptibility: A comparison of two Naval aviator populations
[AD-A172222] N87-15693
ACOUSTO-OPTICS
Integrated optic modules for multichannel deflection/switching and signal processing
[AD-A171178] N87-15789
ACROLEINS
Inhalation toxicology. Part 7: Times to incapacitation and death for rats exposed continuously to atmospheric acrolein vapor
[AD-A169686] N87-15680
ACTIVATED CARBON
Stibine filter for antimonial lead acid batteries
[AD-D012427] N87-15419
ACUITY
Noise susceptibility: A comparison of two Naval aviator populations
[AD-A172222] N87-15693
ADA (PROGRAMMING LANGUAGE)
Ada applications to real-time computer systems
[AD-A169493] N87-15723
ADAPTATION
Degradation in performance of adaptive null-steering antennas
[AD-A169663] N87-15396
ADAPTIVE CONTROL
Procedure for computing transonic flows for control of adaptive wind tunnels
[NASA-TM-88530] N87-15235
End-point control of flexible manipulators
[AD-A172287] N87-15471
Adaptive control of robotic manipulators N87-15700
ADHESIVE BONDING
Adhesion, friction, and deformation of ion-beam-deposited boron nitride films
[NASA-TM-88902] N87-15305
An interdisciplinary approach to predictive modeling of structural adhesive bonding. Characterization of Ti-6Al-4V oxides and the adhesive/oxide interphase
[AD-A172313] N87-15312
Durability of structural adhesively bonded systems
[AD-A170708] N87-15492
Stress in a bonded wafer
[AD-A171056] N87-15493
ADVECTION
Nowcasting thermodynamic profiles using a triangle of wind profilers in an advection model
[AD-A171288] N87-15673
AERIAL PHOTOGRAPHY
Problems in the application of thermal images in urban climatology N87-15649
AERIAL RECONNAISSANCE
The unmanned air reconnaissance system
[AD-A171165] N87-15206
AEROACOUSTICS
A comparison of the acoustic and aerodynamic measurements of a model rotor tested in two anechoic wind tunnels
[NASA-TM-88364] N87-15178
AERODYNAMIC CHARACTERISTICS
Low-speed aerodynamic characteristics of a wing-canard configuration with underwing spanwise blowing on the trailing-edge flap system
[NASA-TM-89020] N87-15180
Aerodynamic characteristics of two-dimensional wing configurations at angles of attack near -90 deg
[NASA-TM-88373] N87-15182
Wind tunnel data from a rotor wake/airframe interaction study
[AD-A171333] N87-15190
AERODYNAMIC CONFIGURATIONS
AGARD Fluid Dynamics Panel Symposium on Applications of Computational Fluid Dynamics in Aeronautics: Proceedings
[NASA-TM-88356] N87-15181
AERODYNAMIC DRAG
Drag predictions for projectiles at transonic and supersonic speeds
[AD-A171462] N87-15191
Supersonic flow over cylindrical afterbodies with base bleed
[AD-A171461] N87-15448
Issues concerning the evaluation of effective surface roughness of heterogeneous terrain N87-15556
AERODYNAMIC INTERFERENCE
A simplified fourwall interference assessment procedure for airfoil data obtained in the Langley 0.3-meter transonic cryogenic tunnel
[NASA-CR-4042] N87-15187
AERODYNAMIC LOADS
Unsteady aerodynamic load estimates on turning vanes in the national full-scale aerodynamic complex
[NASA-TM-88191] N87-15179
AERODYNAMIC STABILITY
Dynamic stability of hingeless and bearingless rotor blades in forward flight N87-15201
AERODYNAMICS
Formulation and minimality of nonlinear discrete time control systems N87-15233
AEROELASTICITY
Dynamic stability of hingeless and bearingless rotor blades in forward flight N87-15201
AERONAUTICAL ENGINEERING
The dynamic scaling and development of model helicopter rotor blades for the RAE 24ft wind tunnel test rig
[RAE-TR-85052] N87-15203
AEROSOLS
Effects of atmospheric aerosol size distributions on the retrieval of surface spectral radiance from satellite N87-15596
Effect of measured aerosol absorption on the radiation budget N87-15646

The correlation between the physico-chemical and optical properties of tropospheric aerosols with regard to the radiation budget (POETA) program N87-15647

AEROSPACE ENGINEERING

A decision support system for space technology tradeoffs: A microcomputer application [AD-A172379] N87-15910

AEROSPACE ENVIRONMENTS

Shuttle contamination modeling: Evolution of ionized shuttle exhaust, environmental research papers [AD-A172276] N87-15257

Space spider crane [NASA-CASE-LAR-13411-1] N87-15259

Quadrupole ion/neutral mass spectrometer for space shuttle applications: Environmental research papers [AD-A172275] N87-15265

Gas particle radiator [NASA-CASE-LEW-14297-1] N87-15452

AEROSPACE MEDICINE

USSR Space Life Sciences Digest, issue 9 [NASA-CR-3922(10)] N87-15679

AEROSPACE SCIENCES

Space mathematics: A resource for secondary school teachers [NASA-EP-175] N87-15742

AEROSPACE SYSTEMS

Optimization of closed loop eigenvalues: Maneuvering, vibration control and structure/control design iteration for flexible spacecraft [AD-A172716] N87-15263

AEROSPACEPLANES

NASA authorizations, fiscal year 1987 [GPO-61-975] N87-15904

AEROTHERMODYNAMICS

Unsteady aerodynamic and heat transfer processes in a transonic turbine stage N87-15220

The effect of wake passing on turbine blades N87-15221

Thermodynamic and Flow Mechanical Problems in Aircraft and Spacecraft Drives. Summary of conference reports for 1974, 1975, 1976 [ETN-87-98750] N87-15223

AFRICA

An objective monitoring method for African rainfall based on Meteosat VIS and IR images — visible images (vis) N87-15586

Rainfall estimation over the Sahel using Meteosat thermal infra-red data N87-15587

Observations of the seasonal variability of soil moisture and vegetation cover over Africa using satellite microwave radiometry N87-15593

African drought: An example of the influence of land-surface properties on climate N87-15602

The Sahel droughts: 1941-1984 N87-15603

AFTERBODIES

Supersonic flow over cylindrical afterbodies with base bleed [AD-A171461] N87-15448

AFTERBURNING

Method and apparatus for increasing service life of augmentor and combustion chamber liners [AD-D012443] N87-15273

AGING (MATERIALS)

Small, self-contained aircraft fatigue data recorder [AD-A172400] N87-15207

Surveillance report. Stage 1: Dissected Motor/Propellant Motor Number 0012029 [AD-A171132] N87-15274

Aging of polyurethane foams, the influence of gas diffusion on thermal conductivity [DE86-014339] N87-15314

AGRICULTURE

Mapping of agricultural lands in the USSR N87-15507

Modelisation of evapotranspiration and soil available water over an agricultural region applicable for remote sensing N87-15554

Use of remote sensing application for agricultural expansion into semi-arid areas of Kenya N87-15607

AIR

Structural-mechanics behavior of insulating glass units [PB86-234614] N87-15316

Intense and short pulse electric field (dc and microwave) air breakdown parameters [AD-A172227] N87-15878

AIR DEFENSE

Implications of the strategic defense initiative for ABM treaty [AD-A171145] N87-15909

AIR INTAKES

An experimental investigation of combustion modulation techniques for a solid fuel ramjet [AD-A172322] N87-15230

AIR LAND INTERACTIONS

Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference [ESA-SP-248] N87-15544

WCRP (World Climate Research Program) on Land Surface Processes and Climate: Objectives and requirements N87-15546

Boundary layer parameterizations and land surface processes in GFDL GCMS — Geophysical Fluid Dynamics Laboratory General Circulation Models (GFDL CGMs N87-15549

Evolving ideas on the boundary layer concerning regional evaporation N87-15550

Land-surface parameterization in the Japan Meteorological Agency (JMA) operational spectral model N87-15551

Treatment of land-surface properties in the ECMWF model — European Center for Medium Range Weather Forecasts (ECMWF) N87-15552

A boundary layer and soil moisture for use in GCMs — General Circulation Models (GCM) N87-15555

Issues concerning the evaluation of effective surface roughness of heterogeneous terrain N87-15556

Zero-D sensitivity studies with the NCAR CCM land surface parameterization scheme — Community Climate Model (CCM) N87-15562

Sensitivity of the annual cycle simulated by a General Circulation Model (GCM) to a change in land surface albedo N87-15563

The sensitivity of the UK Meteorological Office atmospheric general circulation model to recent changes to the parameterization of hydrology N87-15564

The sensitivity experiment to land-surface boundary conditions with the Meteorological Research Institute General Circulation Model (MRI GCM) N87-15565

Indications of the sensitivity of European climate to land use variations using a one-dimensional model N87-15566

Climatic effect of snowfall anomaly in mid-high latitudes in a one-dimensional air-land model N87-15567

The fundamental problems for the energy balance study by satellite imagery N87-15590

African drought: An example of the influence of land-surface properties on climate N87-15602

Hydrological atmospheric pilot experiment (HAPEX) 86 N87-15627

AIR POLLUTION

Automotive Spark-Ignition Engine in a New European Context. Proceedings [DE86-753253] N87-15468

Quality assurance methods manual for experimental design and data management [DE86-015180] N87-15473

Field test to intercompare carbon monoxide, nitric oxide and hydroxyl instrumentation at Wallops Island, Virginia [NASA-TM-87718] N87-15524

AIR TRAFFIC CONTROL

An evaluation of descent strategies for TNAV-equipped aircraft in an advanced metering environment [NASA-CR-178093] N87-15197

Air traffic control radar beacon system transponder performance study and analysis. Vol. 1: Transponder test methodology results, analysis and recommendations [DOT/FAA/FS-86/1.1-VOL-1] N87-15198

Air traffic control: FAA's (Federal Aviation Administration's) advanced automation system acquisition strategy is risky [PB86-231743] N87-15200

AIRBORNE EQUIPMENT

The modulation transfer of the Airborne Version of the Conical Scan Radiometer (AVCSR) N87-15654

AIRCRAFT ACCIDENTS

Aircraft accident reports: Brief format, US civil and foreign aviation, issue number 7 of 1985 accidents [PB86-916921] N87-15195

Aircraft accident reports: Brief format, US civil and foreign aviation, issue number 6 of 1985 accidents [PB86-916920] N87-15196

AIRCRAFT ANTENNAS

Radiation resistance of thin antennas of arbitrary elevation and configuration over perfectly conducting ground [AD-A170945] N87-15397

AIRCRAFT COMMUNICATION

Mobile aviation services in the 1545-1559/1646.5-1660.5 MHz band N87-15364

AIRCRAFT COMPARTMENTS

Inhalation toxicology. Part 7: Times to incapacitation and death for rats exposed continuously to atmospheric acrolein vapor [AD-A169666] N87-15680

AIRCRAFT CONFIGURATIONS

Boundary layer transition control for takeoff and landing configurations N87-15162

Experiences with transition fixing in the high speed regime at NLR, Netherlands N87-15163

AIRCRAFT CONTROL

Flared landing approach flying qualities. Volume 1: Experiment design and analysis [NASA-CR-178188-VOL-1] N87-15234

AIRCRAFT DESIGN

Problems of the application of wind tunnel results to aerodynamic performance of large aircraft N87-15161

AIRCRAFT ENGINES

Small, self-contained aircraft fatigue data recorder [AD-A172400] N87-15207

Thermodynamic and Flow Mechanical Problems in Aircraft and Spacecraft Drives. Summary of conference reports for 1974, 1975, 1976 [ETN-87-98750] N87-15223

AIRCRAFT LANDING

Boundary layer transition control for takeoff and landing configurations N87-15162

AIRCRAFT PARTS

Effect of cold-working by hole expansion on fatigue life of 7075-T7351 and 7475-T761 aluminum lugs with and without initial flaws under maneuver loading spectrum [TAE-561] N87-15291

AIRCRAFT PERFORMANCE

Boundary layer control by transition fixing [ESA-TT-909] N87-15160

Problems of the application of wind tunnel results to aerodynamic performance of large aircraft N87-15161

AIRCRAFT SAFETY

International Aerospace and Ground Conference on Lightning and Static Electricity. Technical papers: The key to lightning technology, held in Orlando, Florida on 26-28 June 1984 [AD-A169867] N87-15192

Aircraft accident reports: Brief format, US civil and foreign aviation, issue number 6 of 1985 accidents [PB86-916920] N87-15196

AIRCRAFT STABILITY

Flared landing approach flying qualities. Volume 1: Experiment design and analysis [NASA-CR-178188-VOL-1] N87-15234

AIRFOILS

TRANDESNF: A computer program for transonic airfoil design and analysis in nonuniform flow [NASA-CR-4044] N87-15186

A simplified fourwall interference assessment procedure for airfoil data obtained in the Langley 0.3-meter transonic cryogenic tunnel [NASA-CR-4042] N87-15187

Formulation and minimality of nonlinear discrete time control systems N87-15233

AIRFRAMES

Wind tunnel data from a rotor wake/airframe interaction study [AD-A171333] N87-15190

Small, self-contained aircraft fatigue data recorder [AD-A172400] N87-15207

ALBEDO

Parameterization of albedo, thermal inertia, and surface roughness of desert scrub/sandy soil surface N87-15557

ALGORITHMS

An efficient algorithm for solution of the unsteady transonic small-disturbance equation [NASA-TM-89014] N87-15176

Development of upwind schemes for the Euler equations [NASA-CR-4043] N87-15188

Table look-up estimation of signal and noise parameters from quantized observables N87-15341

A generalized algorithm to design finite field normal basis multipliers N87-15343

A new algorithm for microwave delay estimation from water vapor radiometer data N87-15345

Methods of multiple access communications with energy detectors [AD-A172757] N87-15409

A locally implicit method for fluid flow problems [NASA-CR-178989] N87-15443

Nonlinear wave vacillation in the atmosphere [NASA-CR-179985] N87-15659

Nonsequential computation and laws of nature [AD-A171505] N87-15731

The power of the queue [AD-A171536] N87-15732

Tight bounds for minimax grid matching, with applications to the average case analysis of algorithms [AD-A171552] N87-15733

A programming environment for parallel vision algorithms [AD-A171561] N87-15739

Vector image method for the derivation of elastostatic solutions for point sources in a plane layered medium. Part 1: Derivation and simple examples [NASA-CR-180062] N87-15743

Image method for the derivation of point sources in elastostatic problems with plane interfaces
[NASA-CR-180060] N87-15744

ALIGNMENT
Harmonic conversion of GEKKO 12 high-power Nd:glass laser N87-15767

ALIPHATIC COMPOUNDS
Comparison of flexural properties of aramid-reinforced pultrusions having varied matrices, pretreatments and postcures
[NASA-TM-88997] N87-15277

ALKALINE BATTERIES
Method of increasing the useful life of rechargeable lithium batteries
[AD-D012444] N87-15421

ALKYL COMPOUNDS
NMR (Nuclear Magnetic Resonance) investigations of liquid propellant systems consisting of alkyl- and hydroxyl-ammonium nitrates. Part 1: Characterization of Carbon-13, proton, and Nitrogen-15 NMR spectra and analytical applications
[AD-A171577] N87-15319

ALL-WEATHER AIR NAVIGATION
International Aerospace and Ground Conference on Lightning and Static Electricity. Technical papers: The key to lightning technology, held in Orlando, Florida on 26-28 June 1984
[AD-A169867] N87-15192
The unmanned air reconnaissance system
[AD-A171165] N87-15206

ALLOCATIONS
NASA authorizations, fiscal year 1987
[GPO-61-975] N87-15904

ALLOYS
An overview of CVD processes
[NASA-TM-88450] N87-15283

ALPINE METEOROLOGY
Vegetation index and surface temperature in a mesoscale climate model — Alps N87-15592
Measurements and estimations of the energy balance and surface temperature of the Dischma Valley (Switzerland) N87-15650

ALUMINUM
FEM model of 3D transient temperature and stress fields in welded plates N87-15478

ALUMINUM ALLOYS
Metallurgical variables influencing the corrosion susceptibility of P/M (Powder Metallurgy) 7091 Aluminum/SiCw composite
[AD-A170946] N87-15294
Investigation of the elastic behavior of Al-Li-X alloys
[AD-A171224] N87-15295
An interdisciplinary approach to predictive modeling of structural adhesive bonding. Characterization of Ti-6Al-4V oxides and the adhesive/oxide interphase
[AD-A172313] N87-15312

AMIDES
Comparison of flexural properties of aramid-reinforced pultrusions having varied matrices, pretreatments and postcures
[NASA-TM-88997] N87-15277

AMINES
Dielectric analysis of the cure of thermosetting epoxy/amine systems
[AD-A171274] N87-15308

AMMONIA
Digital simulation of the measured electrochemical response of reversible redox couples at microelectrode arrays: Consequences arising from closely spaced ultramicroelectrodes, revision
[AD-A170943] N87-15423

AMMONIUM NITRATES
NMR (Nuclear Magnetic Resonance) investigations of liquid propellant systems consisting of alkyl- and hydroxyl-ammonium nitrates. Part 1: Characterization of Carbon-13, proton, and Nitrogen-15 NMR spectra and analytical applications
[AD-A171577] N87-15319

AMPLIFICATION
Amplification of electrical signals with molecule-based transistors: Power amplification up to a kilohertz frequency and factors limiting higher frequency operation
[AD-A172709] N87-15434

AMPLIFIERS
High performance crystal oscillator development
[AD-A172631] N87-15433

AMPLITUDE MODULATION
A comparison of single-sideband, suppressed-carrier and double-sideband, full-carrier amplitude modulation
[P-7254] N87-15394
The perception of the higher derivatives of visual motion
[AD-A171076] N87-15687

AMPLITUDES
Longwave propagation: A brief review
[AD-A171147] N87-15400
Signal-to-noise ratio requirements for detection of multiple pulses subject to partially correlated fading with chi-squared statistics of various degrees of freedom
[AD-A172223] N87-15405

ANALOG TO DIGITAL CONVERTERS
Mass digitization: The old way. Experiences with a manual digitizing system — cartography N87-15503
Integrated optic modules for multichannel deflection/switching and signal processing
[AD-A171178] N87-15789

ANALYSIS (MATHEMATICS)
The detailed mathematical prediction of simultaneous heat and mass transfer in cavities N87-15440

ANDES MOUNTAINS (SOUTH AMERICA)
Mountain building processes in the Central Andes
[NASA-CR-180069] N87-15661

ANECHOIC CHAMBERS
A comparison of the acoustic and aerodynamic measurements of a model rotor tested in two anechoic wind tunnels
[NASA-TM-88364] N87-15178

ANGLE OF ATTACK
Aerodynamic characteristics of two-dimensional wing configurations at angles of attack near -90 deg
[NASA-TM-88373] N87-15182

ANGULAR RESOLUTION
The effect of viewing aspect on climatological cloud distribution
[AD-A170440] N87-15672

ANISOTROPIC MEDIA
Clear land anisotropy conversion factors: A comparison of theoretical and experimental results — Earth atmosphere N87-15581
Determination of the albedo of inhomogeneous land surfaces N87-15582

ANISOTROPY
Investigation of magnetostatic surface waves for anisotropic effects
[AD-A172375] N87-15774
Scalar fields in Kasner-type space-times: Time dependent vacuum expectation values
[DE86-702622] N87-15896

ANNIHILATION REACTIONS
Two-photon annihilation radiation in strong magnetic field — pulsars N87-15847

ANNUAL VARIATIONS
Sensitivity of the annual cycle simulated by a General Circulation Model (GCM) to a change in land surface albedo N87-15563
Observations of the seasonal variability of soil moisture and vegetation cover over Africa using satellite microwave radiometry N87-15593
Variation of skin temperature in desert regions in the neighbourhood of India in relation to Asian monsoon circulation N87-15620

ANODES
Cathode including a non fluorinated linear chain polymer as the binder, method of making the cathode, and lithium electrochemical cell containing the cathode
[AD-D012464] N87-15429

ANOMALIES
Climatic effect of snowfall anomaly in mid-high latitudes in a one-dimensional air-land model N87-15567

ANTENNA ARRAYS
Software development for the VLA-GDSCC telemetry array project N87-15348
Ground plane interference elimination by passive element
[NASA-CASE-NPO-16632-1-CU] N87-15390
Interleaved arrays antenna technology development
[NASA-CR-171951] N87-15393
Degradation in performance of adaptive null-steering antennas
[AD-A169663] N87-15396
Research program on a compact and high-power microwave tube
[AD-A171567] N87-15430

ANTENNA COMPONENTS
Ground plane interference elimination by passive element
[NASA-CASE-NPO-16632-1-CU] N87-15390
Interleaved arrays antenna technology development
[NASA-CR-171951] N87-15393
Induced insulator voltage in transmitter antenna guy cables
[AD-A169656] N87-15417

ANTENNA DESIGN
Antenna servo control system characterization: Rate loop analysis for 34-m antenna at DSS 15 N87-15347
Rivited panel surface measurement using photogrammetry N87-15351
Low gain antennas for land-mobile terminals N87-15373
Advanced regional mobile satellite system for the nineties N87-15375
L-band antennas for regional mobile communication satellites N87-15377
Ground plane interference elimination by passive element
[NASA-CASE-NPO-16632-1-CU] N87-15390
Radiation resistance of thin antennas of arbitrary elevation and configuration over perfectly conducting ground
[AD-A170945] N87-15397

ANTENNA FEEDS
Highly decoupled cosited antennas
[AD-D012446] N87-15399

ANTENNA RADIATION PATTERNS
Ground plane interference elimination by passive element
[NASA-CASE-NPO-16632-1-CU] N87-15390
Model of a shaped-beam emission pattern of a satellite antenna for interference analysis
[PB86-238755] N87-15410

ANTENNAS
Design considerations for the beam-waveguide retrofit of a ground antenna station N87-15331
PPM/NAR 8.4-GHz noise temperature statistics for DSN 64-meter antennas, 1982-1984 N87-15350
Pointing calibration of the MKIVA DSN antennas Voyager 2 Uranus encounter operations support N87-15352

ANTHROPOMETRY
Survey of ergonomics databases in member countries of the international ergonomics association
[AD-A171142] N87-15701

ANTIMISSILE DEFENSE
Implications of the strategic defense initiative for ABM treaty
[AD-A171145] N87-15909

ANTIMISSILE MISSILES
An investigation of expert systems usage for software requirements development in the strategic defense initiative environment
[AD-A169659] N87-15724

ANTIMONY COMPOUNDS
Stibine filter for antimonial lead acid batteries
[AD-D012427] N87-15419

APOLLO TELESCOPE MOUNT
Theoretical analysis of segmented Wolter/LSM X-ray telescope systems
[NASA-CR-178986] N87-15915

APPLICATIONS PROGRAMS (COMPUTERS)
Space Shuttle/TDRSS communication and tracking systems analysis
[NASA-CR-171948] N87-15391
Development of Ku-band rendezvous radar tracking and acquisition simulation programs
[NASA-CR-171950] N87-15392
Effects of the oceans on polar motion: Extended investigations
[NASA-CR-179966] N87-15676
Effects of the oceans on polar motion: Extended investigations
[NASA-CR-180066] N87-15677
Test processing system (SEE)
[NASA-TM-88514] N87-15704
The impact on the OCLC interlibrary loan subsystem on ARL libraries N87-15900

APPROACH CONTROL
An evaluation of descent strategies for TNAV-equipped aircraft in an advanced metering environment
[NASA-CR-178093] N87-15197

APPROACH INDICATORS
Aircraft collision warning system
[AD-D012463] N87-15199

APPROPRIATIONS
Department of Housing and Urban Development, and certain independent agencies appropriations for fiscal year 1987, part 2
[S-HRG-99-707-PT-2] N87-15906
National Aeronautics and Space Administration N87-15907
National Aeronautics and Space Administration N87-15908

ARC DISCHARGES
The use of electrical discharge for ignition and control of combustion of solid propellants
[NASA-TM-88548] N87-15317

ARC LAMPS
Self-clamping arc light reflector for welding torch
[NASA-CASE-MFS-29207-1] N87-15786

ARC WELDING
Real time optimization of thin plate TIG arc welding N87-15759
Self-clamping arc light reflector for welding torch
[NASA-CASE-MFS-29207-1] N87-15786

ARCHAEOLOGY
Cosmic ray archaeology, solar activity and supernova explosions N87-15831

ARCHITECTURE (COMPUTERS)
Nonsequential computation and laws of nature
[AD-A171505] N87-15731
ARCTIC REGIONS
Variation in surface albedo and energy-balance in an arctic/subarctic environment N87-15616
ARID LANDS
The use of aerial remote sensing in a case study of desertification: Quixaba-PE
[INPE-3963-PRE/980] N87-15519
Rainfall estimation over the Sahel using Meteosat thermal infra-red data N87-15587
Ground based atmospheric extinction measurement in the Sahel --- satellite monitoring N87-15597
Use of remote sensing application for agricultural expansion into semi-arid areas of Kenya N87-15607
Surface albedo change in arid regions in the Sudan N87-15615
ARRAYS
Thermal vacuum heater array apparatus
[AD-D012436] N87-15420
Digital simulation of the measured electrochemical response of reversible redox couples at microelectrode arrays: Consequences arising from closely spaced ultramicroelectrodes, revision
[AD-A170943] N87-15423
Digital simulation of the measured electrochemical response of reversible redox couples at microelectrode arrays: Consequences arising from closely spaced ultramicroelectrodes
[AD-A171181] N87-15425
Digital simulation of the measured electrochemical response of reversible redox couples at microelectrode arrays: Consequences arising from closely spaced ultramicroelectrodes
[AD-A171272] N87-15427
Modification of microelectrode arrays: New microelectrochemical devices for sensor applications
[AD-A171180] N87-15454
Optical processing
[AD-A172362] N87-15791
ARTIFICIAL INTELLIGENCE
Artificial intelligence through evolutionary programming: Prediction and identification
[AD-A171544] N87-15741
ASPHALT
Facilities technology application tests: Fuel-resistant pavement sealers
[AD-A171473] N87-15238
ASSESSMENTS
A simplified fourwall interference assessment procedure for airfoil data obtained in the Langley 0.3-meter transonic cryogenic tunnel
[NASA-CR-4042] N87-15187
ASTRONOMICAL MODELS
Gas rotation above the galactic disk N87-15873
The transformation from planetary nebula nucleus to white dwarf: A seismological study of stellar metamorphosis N87-15919
The angular sizes of faint radio sources and their implications for cosmology N87-15930
ASTRONOMICAL OBSERVATORIES
Support of Mark 3 optical interferometer
[AD-A171135] N87-15788
ASTRONOMICAL SATELLITES
X-ray satellite (ROSAT)
[NASA-TM-88499] N87-15261
ASTRONOMICAL TELESCOPES
Seeing effects and their calibration for astronomical speckle interferometry N87-15914
ASTRONOMY
Support of Mark 3 optical interferometer
[AD-A171135] N87-15788
ASTROPHYSICS
EX56a study of extended X-ray emission around isolated galaxies EX56b identification and spectra of bright X-ray sources at high galactic latitude
[NASA-CR-180099] N87-15931
ASYMPTOTES
Some asymptotic properties of multivariable models identified by equation error techniques
[EUT-85-E-153] N87-15751
ATLANTIC OCEAN
A cloud climatology for the South Atlantic derived from Meteosat data N87-15633
ATLAS SLV-3 LAUNCH VEHICLE
Status of launch vehicle, satellite and mission related activities for MEOSS --- Mono Electro-Optical Stereo Scanner (MEOSS) N87-15244
ATMOSPHERIC ATTENUATION
Ground based atmospheric extinction measurement in the Sahel --- satellite monitoring N87-15597
Effect of measured aerosol absorption on the radiation budget N87-15646
ATMOSPHERIC BOUNDARY LAYER
The atmospheric boundary layer and its parameterization N87-15548
Evolving ideas on the boundary layer concerning regional evaporation N87-15550
A boundary layer and soil moisture for use in GCMs --- General Circulation Models (GCM) N87-15555
The sensitivity experiment to land-surface boundary conditions with the Meteorological Research Institute General Circulation Model (MRI GCM) N87-15565
ATMOSPHERIC CHEMISTRY
The correlation between the physico-chemical and optical properties of tropospheric aerosols with regard to the radiation budget (POETA) program N87-15647
COCHISE atmospheric nitrogen/oxygen excitation studies
[AD-A172234] N87-15667
ATMOSPHERIC CIRCULATION
Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference
[ESA-SP-248] N87-15544
The atmospheric boundary layer and its parameterization N87-15548
Boundary layer parameterizations and land surface processes in GFDL GCMS --- Geophysical Fluid Dynamics Laboratory General Circulation Models (GFDL CGMs N87-15549
Treatment of land-surface properties in the ECMWF model --- European Center for Medium Range Weather Forecasts (ECMWF) N87-15552
GCM sensitivity studies: Implications for parameterizations of land processes --- General Circulation Models (GCM) N87-15561
Zero-D sensitivity studies with the NCAR CCM land surface parameterization scheme --- Community Climate Model (CCM) N87-15562
Sensitivity of the annual cycle simulated by a General Circulation Model (GCM) to a change in land surface albedo N87-15563
The sensitivity of the UK Meteorological Office atmospheric general circulation model to recent changes to the parameterization of hydrology N87-15564
The sensitivity experiment to land-surface boundary conditions with the Meteorological Research Institute General Circulation Model (MRI GCM) N87-15565
Indications of the sensitivity of European climate to land use variations using a one-dimensional model N87-15566
Nonlinear wave vacillation in the atmosphere
[NASA-CR-179985] N87-15659
ATMOSPHERIC COMPOSITION
Future directions for H sub x O sub y detection
[NASA-CP-2448] N87-15528
Future directions for H sub x O sub y detection, executive summary N87-15529
Ultrasensitive detection of atmospheric trace gases using frequency modulation spectroscopy N87-15535
Indirect determination of OH N87-15537
Measurement of atmospheric HO by a chemical method N87-15538
The determination of the global average OH concentration using a deuteroethane tracer N87-15539
Peroxy radical detection by chemical amplification (PERCA) N87-15540
Tropospheric HO2 determination by FAGE N87-15542
Tunable-diode laser absorption spectrometry N87-15543
On changes in soil moisture in CO2 climate studies N87-15568
Chemistry of the outer planets: Investigations of the chemical nature of the atmosphere of Titan
[NASA-CR-180072] N87-15927
ATMOSPHERIC DENSITY
Thermosphere structure variations during high solar and magnetic activity conditions
[AD-A171350] N87-15666
ATMOSPHERIC DIFFUSION
Mathematical modeling and experimental investigation of heavier-than-air gas dispersion in the atmosphere N87-15526
ATMOSPHERIC EFFECTS
Evolving ideas on the boundary layer concerning regional evaporation N87-15550
Estimation of surface albedo using satellite data. A simple formulation for atmospheric effects N87-15579
ATMOSPHERIC ELECTRICITY
Auroral electron acceleration by lower-hybrid waves
[DE86-703346] N87-15658
ATMOSPHERIC ENTRY
The secret of guided missile re-entry
[AD-A169598] N87-15254
ATMOSPHERIC MODELS
Mathematical modeling and experimental investigation of heavier-than-air gas dispersion in the atmosphere N87-15526
Evolving ideas on the boundary layer concerning regional evaporation N87-15550
Modelisation of evapotranspiration and soil available water over an agricultural region applicable for remote sensing N87-15554
A brief description of the simple biosphere model (SiB) N87-15558
A representation of the terrestrial biosphere for use in global climate studies N87-15559
Parameterization of glacierization for a climate model N87-15560
Indications of the sensitivity of European climate to land use variations using a one-dimensional model N87-15566
Climatic effect of snowfall anomaly in mid-high latitudes in a one-dimensional air-land model N87-15567
On changes in soil moisture in CO2 climate studies N87-15568
Remote sensing identified in climate model experiments with hydrological and albedo changes in the Sahel N87-15569
The fundamental problems for the energy balance study by satellite imagery N87-15590
Radiation and clouds: A summary of international and national activities N87-15631
Hydrological Atmospheric Pilot Experiment (HAPEX) hydrology budget modeling (MOBILHY): Outline of the program N87-15632
Radiation budget variations caused by thin cirrus N87-15636
Investigation into alternative statistical auroral oval models, stage 1
[NASA-CR-180061] N87-15656
A radiative transfer study of the early terrestrial atmospheres N87-15664
Utilization of VAS satellite data in the initialization of an oceanic-cyclogenesis simulation
[NASA-CR-180140] N87-15671
Nowcasting thermodynamic profiles using a triangle of wind profilers in an advection model
[AD-A171288] N87-15673
Models of the Venus ionospheric flow N87-15820
Rediscussion of the model atmosphere of Vega N87-15842
ATMOSPHERIC MOISTURE
Importance of the tropical rain forest as an atmospheric moisture source N87-15608
Nowcasting thermodynamic profiles using a triangle of wind profilers in an advection model
[AD-A171288] N87-15673
ATMOSPHERIC OPTICS
Clear land anisotropy conversion factors: A comparison of theoretical and experimental results --- Earth atmosphere N87-15581
Determination of the albedo of inhomogeneous land surfaces N87-15582
Estimation of atmospheric turbidity --- satellite imagery N87-15645
The correlation between the physico-chemical and optical properties of tropospheric aerosols with regard to the radiation budget (POETA) program N87-15647
Seeing effects and their calibration for astronomical speckle interferometry N87-15914
ATMOSPHERIC PHYSICS
The correlation between the physico-chemical and optical properties of tropospheric aerosols with regard to the radiation budget (POETA) program N87-15647
ATMOSPHERIC RADIATION
Surface radiation budget for climate applications N87-15575
Global and atmospheric radiation at ground from satellite data N87-15637
Determination of the longwave surface net flux from radiances to space N87-15648
Estimate of broadband conversion factors for the Meteosat VIS channel N87-15653
ATMOSPHERIC REFRACTION
Investigation of millimeter wave propagation in the atmosphere
[AD-A171526] N87-15404
ATMOSPHERIC SCATTERING
Effects of atmospheric aerosol size distributions on the retrieval of surface spectral radiance from satellite N87-15596
ATMOSPHERIC SOUNDING
Utilization of satellite data in mesoscale modeling of severe weather
[NASA-CR-179917] N87-15669
Verification of mesoscale objective analyses of VAS and rawinsonde data using the March 1982 AVE/VAS special network data
[NASA-CR-179988] N87-15670
Nowcasting thermodynamic profiles using a triangle of wind profilers in an advection model
[AD-A171288] N87-15673

ATMOSPHERIC TEMPERATURE
Surface temperature from AVHRR and TOVS from the meteorological satellite NOAA 9 N87-15574
Thermosphere structure variations during high solar and magnetic activity conditions [AD-A171350] N87-15666
Nowcasting thermodynamic profiles using a triangle of wind profilers in an advection model [AD-A171288] N87-15673

ATMOSPHERIC TURBULENCE
Mathematical modeling and experimental investigation of heavier-than-air gas dispersion in the atmosphere N87-15526

ATOMIC CLOCKS
A rubidium clock model [AD-A171133] N87-15773

ATOMIC COLLISIONS
The five deepest potential hypersurfaces of the CH2(+) ion. Description by continuous functions adapted to initial values [MPIS-4/1986] N87-15781

ATOMIC EXCITATIONS
COCHISE atmospheric nitrogen/oxygen excitation studies [AD-A172234] N87-15667

ATOMIC INTERACTIONS
Interatomic interactions in solids: An effective medium approach [AD-A171518] N87-15887

ATTENTION
Attention and preparatory processes in the central nervous system [AD-A171316] N87-15689

ATTENUATION
Ultrasonic backscatter and attenuation measurements for microstructure characterization: Application to consolidated rapidly solidified type 304 stainless steel powder [DE86-014917] N87-15300

ATTITUDE (INCLINATION)
Observations of hierarchal grain boundary dislocation structures in 001 symmetric tilt boundaries in gold [DE86-015729] N87-15301

AUDIO FREQUENCIES
Research in nonlinear acoustics [AD-A172634] N87-15777

AUDITORY DEFECTS
Noise susceptibility: A comparison of two Naval aviator populations [AD-A172222] N87-15693

AUDITORY PERCEPTION
Noise susceptibility: A comparison of two Naval aviator populations [AD-A172222] N87-15693

AURORAS
Investigation into alternative statistical auroral oval models, stage 1 [NASA-CR-180061] N87-15656
Auroral electron acceleration by lower-hybrid waves [DE86-703346] N87-15658

AUSTENITIC STAINLESS STEELS
Detecting and monitoring crack growth in austenitic and ferritic steels [DE86-014348] N87-15299

AUTOMATIC CONTROL
Air traffic control: FAA's (Federal Aviation Administration's) advanced automation system acquisition strategy is risky [PB86-231743] N87-15200
Adaptive modeling of the dynamics of autonomous land vehicles [AD-A172404] N87-15911

AUTOMATIC WEATHER STATIONS
Comparison of measured and modeled radiation, heat and water vapor fluxes: FIFE pilot study [NASA-CR-179989] N87-15516

AUTOMATION
Use of disjunctive response requirements in dual-task environments: Implications for automation [AD-A171277] N87-15702

AUTOMOBILES
Low gain antennas for land-mobile terminals N87-15373
Automotive Spark-Ignition Engine in a New European Context. Proceedings [DE86-753253] N87-15466

AVALANCHE DIODES
A cooled avalanche photodiode with high photon detection probability N87-15334

AVALANCHES
Effect of sonic boom on avalanches. Preparation for flight of a supersonic jet over the Lavay Valley [NASA-TM-88535] N87-15775

AVIONICS
Handbook. Volume 1: Validation of digital systems in avionics and flight control applications [DOT/FAA/CT-82/115-VOL-1-REV] N87-15204

AXES OF ROTATION
On the effect of differential rotation on axisymmetric and nonaxisymmetric magnetic fields of cosmic bodies N87-15876

B

BACKSCATTERING
Ultrasonic backscatter and attenuation measurements for microstructure characterization: Application to consolidated rapidly solidified type 304 stainless steel powder [DE86-014917] N87-15300
Depolarization and scattering of electromagnetic waves [AD-A171217] N87-15401

BAKING
Development of coating materials and feeding processes for energy-optimized baking of carbon products [BMFT-FB-T-86-001] N87-15315

BALL BEARINGS
Lubricant effects on bearing life [NASA-TM-88675] N87-15467

BALLOON SOUNDING
Tethered balloon measurements at San Nicolas Island (October 1984): Instrumentation, data summary, preliminary data interpretation [AD-A172226] N87-15674

BALLOON-BORNE INSTRUMENTS
Tethered balloon measurements at San Nicolas Island (October 1984): Instrumentation, data summary, preliminary data interpretation [AD-A172226] N87-15674

BANDWIDTH
Aircraft collision warning system [AD-D012463] N87-15199
A communication bandwidth model for shuffle-exchange and augmented shuffle-exchange interprocessor communication networks [AD-A171287] N87-15402

BAROCLINIC INSTABILITY
Nonlinear wave vacillation in the atmosphere [NASA-CR-179985] N87-15659

BARREN LAND
Remote sensing identified in climate model experiments with hydrological and albedo changes in the Sahel N87-15569
Vegetation index models for the assessment of vegetation in marginal areas N87-15584

BASALT
Meteoritic basalts: The nakhlites, their parental magmas, cooling rates, and equivalents on Earth [NASA-CR-180071] N87-15922

BASE FLOW
Supersonic flow over cylindrical afterbodies with base bleed [AD-A171461] N87-15448

BATTERY CHARGERS
Method of increasing the useful life of rechargeable lithium batteries [AD-D012444] N87-15421

BEAM WAVEGUIDES
Design considerations for the beam-waveguide retrofit of a ground antenna station N87-15331

BEAMS (RADIATION)
Investigation of magnetostatic surface waves for anisotropic effects [AD-A172375] N87-15774
Research in nonlinear acoustics [AD-A172634] N87-15777
Blazars: Beamed or not beamed — quasars, BL Lac objects N87-15801

BEAMS (SUPPORTS)
Mobile remote manipulator system for a tetrahedral truss [NASA-CASE-MSC-20985-1] N87-15260

BED REST
Bedrest in healthy women: Effects of menstrual function and oral contraceptives [NASA-CR-171946] N87-15681

BIBLIOGRAPHIES
Limit cycles in digital filters: A bibliography 1975-1984 [EUT-85-E-154] N87-15411
Survey of ergonomics databases in member countries of the international ergonomics association [AD-A171142] N87-15701

BIG BANG COSMOLOGY
Topics in cosmology and particle physics [DE86-014830] N87-15923

BINARY STARS
Equilibrium and stability of galaxies in binary systems N87-15796

BIOCHEMISTRY
Biochemical changes in bone in a model of weightlessness [NASA-CR-180095] N87-15683
Technology Reports of the Osaka University, volume 36, nos. 1844-1864 [ISSN-0030-6177] N87-15754

BIOMASS
Group Agromet Monitoring Project (GAMP) methodology integrated mapping of rainfall, evapotranspiration, germination, biomass development and thermal inertia, based on Meteosat and conventional meteorological data N87-15626

BIOSPHERE
A brief description of the simple biosphere model (SiB) N87-15558
A representation of the terrestrial biosphere for use in global climate studies N87-15559

BIPOLAR TRANSISTORS
Delay modeling of bipolar ECL/EFL (Emitter-Coupled Logic/Emitter-Follower-Logic) circuits [AD-A171131] N87-15424
Fundamental aspects of heterojunction bipolar transistor technology [AD-A171225] N87-15426

BIPOLARITY
Delay modeling of bipolar ECL/EFL (Emitter-Coupled Logic/Emitter-Follower-Logic) circuits [AD-A171131] N87-15424

BISMALEIMIDE
Process for curing bismaleimide resins [NASA-CASE-ARC-11429-4] N87-15304

BISTABLE CIRCUITS
Optical processing [AD-A172362] N87-15791

BIT ERROR RATE
Land mobile satellite communications: Channel model, modulation, and error control N87-15370

BL LACERTAE OBJECTS
Blazars: Beamed or not beamed — quasars, BL Lac objects N87-15801

BLACK HOLES (ASTRONOMY)
The nonlinear turbulent dynamo in the accretion disks of black holes N87-15869
Model of bimodal behavior of Cygnus X-1 N87-15875

BLANKETS (FUSION REACTORS)
Tensile behavior of helium-implanted and neutron-irradiated V-15Cr-5Ti [DE86-007301] N87-15292

BLOOD
A new approach to non-invasive oxygenated mixed venous PCO(sub)2 [NASA-CR-171949] N87-15682

BLOWDOWN WIND TUNNELS
Investigation of the components of the NAL high Reynolds number two-dimensional wind tunnel. Part 4: Design, construction and performance of the exhaust silencer [NASA-TM-88513] N87-15237

BLUNT BODIES
Computational fluid dynamic studies of certain ducted bluff-body flowfields relevant to turbojet combustors. Volume 2: Time-averaged flowfield predictions for a proposed centerbody combustor [AD-A171169] N87-15447

BODY-WING AND TAIL CONFIGURATIONS
Canard/Tail transonic analysis [AD-A171075] N87-15189

BOLTS
LaRC conceptual design of solid rocket booster in-line bolted joint [NASA-TM-89046] N87-15177

BONE DEMINERALIZATION
Biochemical changes in bone in a model of weightlessness [NASA-CR-180095] N87-15683

BOOLEAN ALGEBRA
Proposal for an algebraic semantics definition formalism. Annexe D4.A3 of deliverable D4 - second review — programming languages [CWI-CS-R8504] N87-15719
Partial evaluation and omega-completeness of algebraic specifications. Annexe D5.A1 of deliverable D5 - second review — computer systems programs [CWI-CS-R8501] N87-15721

BOOSTER ROCKET ENGINES
LaRC conceptual design of solid rocket booster in-line bolted joint [NASA-TM-89046] N87-15177
Air breathing jet engines for satellite launcher vehicles. Analysis and comparison of suitable propulsion concepts N87-15226

BORON CHLORIDES
Preparation of B-Trichloroborazine
[NASA-CASE-ARC-11643-1-SB] N87-15275
BORON NITRIDES
Adhesion, friction, and deformation of ion-beam-deposited boron nitride films
[NASA-TM-88902] N87-15305
BOUNDARY LAYER CONTROL
Boundary layer control by transition fixing
[ESA-TT-909] N87-15160
Boundary layer transition control for takeoff and landing configurations N87-15162
Experiences with transition fixing in the high speed regime at NLR, Netherlands N87-15163
Transition fixing in the high speed range for the development of civil aircraft wings N87-15164
Transition fixing on wings in industrial wind tunnels and associated problems N87-15165
Transition fixing and simulation of high Reynolds number flow at transonic velocities N87-15169
An experimental investigation of a circular thrust augmenting ejector
[AD-A172376] N87-15231
BOUNDARY LAYER EQUATIONS
Numerical solution of laminar and turbulent boundary layer equations including transition and experimental study of a flat plate with a blunt fin at incidence
[AD-A172409] N87-15450
BOUNDARY LAYER FLOW
An experimental investigation of wall pressure fluctuations beneath non-equilibrium turbulent flows
[AD-A171508] N87-15449
BOUNDARY LAYER PLASMAS
Spontaneous reconnection in the Earth's magnetotail N87-15825
BOUNDARY LAYER TRANSITION
Boundary layer control by transition fixing
[ESA-TT-909] N87-15160
Boundary layer transition control for takeoff and landing configurations N87-15162
Experiences with transition fixing in the high speed regime at NLR, Netherlands N87-15163
Transition fixing in the high speed range for the development of civil aircraft wings N87-15164
Transition fixing on wings in industrial wind tunnels and associated problems N87-15165
The influence of transition strips on the pressure distribution on transonic profiles N87-15166
Development of an artificial boundary layer for different outlet flows N87-15167
Investigation of the conditions for tripping transition with roughness elements and their influence on boundary layer development N87-15168
Transition fixing and simulation of high Reynolds number flow at transonic velocities N87-15169
Transition detection using surface pressure holes N87-15170
Investigation of the experimental detection of boundary layer transition N87-15171
Simulating the effects of curvature, free stream turbulence, and transition — heat transfer on gas turbine blades N87-15215
Numerical solution of laminar and turbulent boundary layer equations including transition and experimental study of a flat plate with a blunt fin at incidence
[AD-A172409] N87-15450
BOUNDARY VALUE PROBLEMS
Transonic controversy and regular perturbation methods for subcritical flows N87-15172
On the need to benchmark simulation codes — boundary layer flow N87-15214
Basic equations and solution method for the calculation of the transient electromechanical response of dielectric devices
[DE86-012728] N87-15436
Conservative boundary conditions for 3D gas dynamics problems
[NASA-TM-88487] N87-15444
Nonlinear wave vacillation in the atmosphere
[NASA-CR-179985] N87-15659
Effects of the oceans on polar motion: Extended investigations
[NASA-CR-179986] N87-15676
Optimization of continuum structures using a boundary element formulation N87-15705
Initial-boundary value problems for linear hyperbolic systems
[AD-A171527] N87-15747
Feasibility and comparison investigation of the use of the Fast Fourier Transform and finite difference method for numerical solution of boundary value problems
[AD-A172719] N87-15749
Iterative methods and preconditioning for solving large system of linear equations N87-15756
Natural convection of stably stratified fluid layer with uniform heating from below N87-15771
BOX BEAMS
Dynamic testing of a two-dimensional box truss beam
[NASA-CR-4039] N87-15262
BRAIN
Attention and preparatory processes in the central nervous system
[AD-A171316] N87-15689
BRAZIL
The use of aerial remote sensing in a case study of desertification: Quixabe-PE
[INPE-3963-PRE/960] N87-15519
BREADBOARD MODELS
Small, self-contained aircraft fatigue data recorder
[AD-A172400] N87-15207
Breadboard RL10-11B low thrust operating mode
[NASA-CR-174914] N87-15269
BRIGHTNESS
Infrared and CCD photometric study of spiral galaxies N87-15913
BROADBAND
Estimate of broadband conversion factors for the Meteosat VIS channel N87-15653
BUBBLES
Cloud cavitation and collective bubble dynamics
[AD-A170692] N87-15446

C

CADASTRAL MAPPING
Mapping of agricultural lands in the USSR N87-15507
CALDERAS
Studies of stress and deformation in the Earth's crust: Part 1: Determining the state of stress in the Earth from earthquake focal mechanism data. Part 2: Deformation around the Creede Caldera, San Juan volcanic field, southwest Colorado: Implications for Caldera mechanics N87-15527
CALIBRATING
Pointing calibration of the MKIVA DSN antennas Voyager 2 Uranus encounter operations support N87-15352
New approach for calibration and interpretation of IRAD GAGE vibrating-wire stressmeters
[DE86-010975] N87-15455
Variations in in-flight absolute radiometric calibration — satellite remote sensors N87-15594
Ultrasonic measurements research: Improved acoustic emission methods
[AD-A172726] N87-15778
Seeing effects and their calibration for astronomical speckle interferometry N87-15914
CANADA
MSAT system and service description — mobile communications N87-15387
Preliminary results of anthropogenic albedo changes over the past 15 years in Eastern Canada N87-15617
CANARD CONFIGURATIONS
Low-speed aerodynamic characteristics of a wing-canard configuration with underwing spanwise blowing on the trailing-edge flap system
[NASA-TM-89020] N87-15180
CANOPIES (VEGETATION)
Estimation of vegetation cover at subpixel resolution using LANDSAT data
[NASA-CR-177077] N87-15514
Comparison of measured and modeled radiation, heat and water vapor fluxes: FIFE pilot study
[NASA-CR-179989] N87-15516
Canopy reflectance modeling in a tropical wooded grassland
[NASA-CR-180097] N87-15518
A brief description of the simple biosphere model (SiB) N87-15558
Vegetation index models for the assessment of vegetation in marginal areas N87-15584
CAPACITANCE-VOLTAGE CHARACTERISTICS
Program to analyze the failure mode of lead-acid batteries
[NUREG-CR-4833] N87-15415
CAPACITORS
An experimental and theoretical study of nuclear-EMP (electromagnetic pulse)-type lightning simulators with combined peaking capacitor and crowbar
[AD-A172648] N87-15407
CARBON
Carbon residue studies with a micro carbon residue tester
[AD-A171153] N87-15306
Development of coating materials and feeding processes for energy-optimized baking of carbon products
[BMFT-FB-T-86-001] N87-15315
CARBON DIOXIDE
A new approach to non-invasive oxygenated mixed venous PCO(sub)2
[NASA-CR-171949] N87-15682
CARBON DIOXIDE CONCENTRATION
On changes in soil moisture in CO2 climate studies N87-15568
CARBON DIOXIDE LASERS
Laser-induced chemical vapor deposition of germanium and doped-germanium films
[AD-D012462] N87-15888
CARBON ISOTOPES
NMR (Nuclear Magnetic Resonance) investigations of liquid propellant systems consisting of alkyl- and hydroxyl-ammonium nitrates. Part 1: Characterization of Carbon-13, proton, and Nitrogen-15 NMR spectra and analytical applications
[AD-A171577] N87-15319
Indirect determination of OH N87-15537
CARBON-CARBON COMPOSITES
Method and apparatus for increasing service life of augmentor and combustion chamber liners
[AD-D012443] N87-15273
Composite piston
[NASA-CASE-LAR-13435-1] N87-15464
CARIBBEAN REGION
Vegetation change and desertification in the Caribbean N87-15619
CARRIER MOBILITY
Electrical conductivity and carrier mobility in polyphenylacetylene and polychlorophenylacetylene and their doping effect N87-15764
CASCADE FLOW
Unsteady aerodynamic load estimates on turning vanes in the national full-scale aerodynamic complex
[NASA-TM-88191] N87-15179
CAST ALLOYS
High temperature monotonic and cyclic deformation in a directionally solidified nickel-base superalloy
[NASA-CR-175101] N87-15303
CASTING
High intensity casting system
[NASA-CASE-NPO-16901-1-CU] N87-15327
CATALYSIS
Study of the kinetics of catalytic decomposition of hydrazine vapors on palladium
[NASA-TM-88549] N87-15286
Development of N(2) sensor for determination of PN(2) in body tissues
[AD-A171330] N87-15690
CATHODES
Cathode including a non fluorinated linear chain polymer as the binder, method of making the cathode, and lithium electrochemical cell containing the cathode
[AD-D012464] N87-15429
CATIONS
Development of N(2) sensor for determination of PN(2) in body tissues
[AD-A171330] N87-15690
CATS
Intracortical interactions in visual processing
[AD-A169674] N87-15684
CAUCHY INTEGRAL FORMULA
Direct calculation of wall interferences and wall adaptation for two-dimensional flow in wind tunnels with closed walls
[NASA-TM-88523] N87-15236
CAVITATION FLOW
Cloud cavitation and collective bubble dynamics
[AD-A170692] N87-15446
On cavitation and residual creep life N87-15758
CAVITIES
The detailed mathematical prediction of simultaneous heat and mass transfer in cavities N87-15440
CELL CATHODES
Cathode including a non fluorinated linear chain polymer as the binder, method of making the cathode, and lithium electrochemical cell containing the cathode
[AD-D012464] N87-15429
CENTRAL PROCESSING UNITS
The virtual tree processor. Deliverable D2.A2 of task T2 N87-15715
CENTRIFUGES
G-tolerance standards for aircrew training and selection
[AD-A170441] N87-15685
CERAMIC BONDING
Composite piston
[NASA-CASE-LAR-13435-1] N87-15464
CERAMIC COATINGS
Development of coating materials and feeding processes for energy-optimized baking of carbon products
[BMFT-FB-T-86-001] N87-15315

CEREBRAL CORTEX
Intracortical interactions in visual processing
[AD-A169674] N87-15684
CEREBRUM
Models of cerebral system mechanics
[AD-A171483] N87-15692
CERENKOV RADIATION
Radiation produced by the modulated electron beam of a free electron laser
[AD-A171168] N87-15457
Collective interactions of neutrinos with dense astrophysical plasmas N87-15837
Distortions of power-law of electrons in turbulent plasma reactor — decametric cosmic rays N87-15841
CESIUM PLASMA
Deviation from local thermodynamic equilibrium in a cesium-seeded argon plasma
[EUT-85-E-152] N87-15881
CHALCOGENIDES
Chalcogenide glasses. Part 4: Crystallization and glass transition characteristics in AS(2-x)Sb(x)S(3) glass-forming system
[AD-A171564] N87-15310
CHALLENGER (ORBITER)
Investigation of the Challenger accident, volume 1
[GPO-84-295] N87-15256
National Aeronautics and Space Administration N87-15907
CHANNELS (DATA TRANSMISSION)
Land mobile satellite communications: Channel model, modulation, and error control N87-15370
CHARACTERIZATION
Ultrasonic backscatter and attenuation measurements for microstructure characterization: Application to consolidated rapidly solidified type 304 stainless steel powder
[DE86-014917] N87-15300
CHARGE CARRIERS
Delay modeling of bipolar ECL/EFL (Emitter-Coupled Logic/Emitter-Follower-Logic) circuits
[AD-A171131] N87-15424
CHARGE COUPLED DEVICES
Characterization of infrared properties of layer semiconductors
[AD-A172692] N87-15893
Infrared and CCD photometric study of spiral galaxies N87-15913
CHARGED PARTICLES
Investigations of the interactions of radiation with matter
[AD-A171232] N87-15779
Calculations of heat deposition in a target system bombarded by high energy charged particles
[DE86-700263] N87-15784
CHARPY IMPACT TEST
Experimental investigations with notched samples of elastic-plastic materials behavior
[W-2/84] N87-15496
CHEMICAL ANALYSIS
Field test to intercompare carbon monoxide, nitric oxide and hydroxyl instrumentation at Wallops Island, Virginia
[NASA-TM-87718] N87-15524
Future directions for H sub x O sub y detection, executive summary N87-15529
OH radical measurements by optical absorption spectroscopy N87-15530
Two-photon laser-induced fluorescence detection of OH N87-15533
OH detection by Ford Motor Company N87-15534
Measurement of atmospheric HO by a chemical method N87-15538
Development of N(2) sensor for determination of PN(2) in body tissues
[AD-A171330] N87-15690
Chemistry of the outer planets: Investigations of the chemical nature of the atmosphere of Titan
[NASA-CR-180072] N87-15927
CHEMICAL COMPOSITION
Quadrupole ion/neutral mass spectrometer for space shuttle applications: Environmental research papers
[AD-A172275] N87-15265
Inhalation toxicology. Part 7: Times to incapacitation and death for rats exposed continuously to atmospheric acrolein vapor
[AD-A169666] N87-15680
CHEMICAL EXPLOSIONS
Overview of major hazards research. Part 1: Of risk and all that — chemical and petrochemical industries N87-15322
CHEMICAL PROPERTIES
Study of nickel hydroxide electrodes. 2: Oxidation products of nickel (2) hydroxides
[NASA-TM-88473] N87-15416
CHEMICAL REACTIONS
Preparation of B-Trichloroborazine
[NASA-CASE-ARC-11643-1-SB] N87-15275
An overview of CVD processes
[NASA-TM-88450] N87-15283
MOPAC manual (version 3.10): A general molecular orbital package, IBM-PC version, 1st edition
[AD-A172361] N87-15313
Effects of phosphoric acid on the lead-acid battery reactions N87-15772
CHIPS (ELECTRONICS)
A single VLSI chip for computing syndromes in the (225, 223) Reed-Solomon decoder N87-15340
CHOLESKY FACTORIZATION
Iterative methods and preconditioning for solving large system of linear equations N87-15756
CHROMIUM ALLOYS
Structure as a criterion for high temperature ductility N87-15485
Fracture mechanics and creep crack growth in steel of the type 1%Cr0.5Mo, with or without preceeding exposure under creep crack circumstances N87-15488
CHROMOSPHERE
Energy dissipation and convective motors in the local MHD-resonance regions in solar chromosphere N87-15806
CIRCUIT BOARDS
Printed circuit card hybrid
[AD-D012448] N87-15428
CIRCUITS
High performance crystal oscillator development
[AD-A172631] N87-15433
CIRCULAR WAVEGUIDES
Linear and nonlinear theory of the Doppler-shifted cyclotron resonance maser based on TE and TM waveguide modes
[AD-A172231] N87-15459
CIRCULATORS (PHASE SHIFT CIRCUITS)
Millimeter wave microstrip circulator utilizing hexagonal ferrites
[AD-D012445] N87-15422
CIRRUS CLOUDS
Radiation budget variations caused by thin cirrus N87-15636
CIVIL AVIATION
Aircraft accident reports: Brief format, US civil and foreign aviation, issue number 7 of 1985 accidents
[PB86-916921] N87-15195
Aircraft accident reports: Brief format, US civil and foreign aviation, issue number 6 of 1985 accidents
[PB86-916920] N87-15196
CLAMPS
Self-clamping arc light reflector for welding torch
[NASA-CASE-MFS-29207-1] N87-15786
CLASSIFICATIONS
Cloud detection and classification over oceans at night with NOAA-7 N87-15651
Subject categorization guide for defense science and technology
[AD-A172650] N87-15903
CLIMATE
WCRP (World Climate Research Program) on Land Surface Processes and Climate: Objectives and requirements N87-15546
A representation of the terrestrial biosphere for use in global climate studies N87-15559
Parameterization of glacierization for a climate model N87-15560
GCM sensitivity studies: Implications for parameterizations of land processes — General Circulation Models (GCM) N87-15561
Sensitivity of the annual cycle simulated by a General Circulation Model (GCM) to a change in land surface albedo N87-15563
Indications of the sensitivity of European climate to land use variations using a one-dimensional model N87-15566
Data needs and data bases for climate studies N87-15571
Evaluation of climate relevant land surface characteristics from remote sensing N87-15572
Surface radiation budget for climate applications N87-15575
Earth rotation polar motion and climatology N87-15601
Remote sensing activites in Turkey: Possible contributions to climate studies N87-15624
Hydrological atmospheric pilot experiment (HAPEX) 86 N87-15627
Future European plans in the framework of the International Satellite Land Surface Climatology Project (ISLSCP) N87-15628
The first International Satellite Land Surface Climatology Project (ISLSCP) Field Experiment - FIFE N87-15629
Radiation and clouds: A summary of international and national activities N87-15631
Effects of regional-scale diurnal variations on the radiation balance of the Earth-atmosphere system N87-15634
CLOCKS
A synchronization technique for optical PPM signals N87-15332
A rubidium clock model
[AD-A171133] N87-15773
CLOSED CIRCUIT TELEVISION
Effects of extended camera baseline and image magnification on target detection time and target recognition with a stereoscopic TV system
[AD-A171063] N87-15398
CLOUD COVER
A cloud climatology for the South Atlantic derived from Meteosat data N87-15633
Influence of multiple cloud layers on planetary albedo N87-15635
Cloud detection and classification over oceans at night with NOAA-7 N87-15651
The effect of viewing aspect on climatological cloud distribution
[AD-A170440] N87-15672
CLOUD PHYSICS
Radiation and clouds: A summary of international and national activities N87-15631
CLUSTER ANALYSIS
Derivation of surface properties from satellite observations N87-15642
CLUTTER
Stationary/slowly moving target detection in strong background clutter
[AD-A172225] N87-15406
COASTAL ZONE COLOR SCANNER
Variations in in-flight absolute radiometric calibration — satellite remote sensors N87-15594
COAXIAL CABLES
Coaxial cable connector
[NASA-CASE-NPO-16764-1] N87-15414
CODING
Space Shuttle/TDRSS communication and tracking systems analysis
[NASA-CR-171948] N87-15391
Nonlinear wave vacillation in the atmosphere
[NASA-CR-179985] N87-15659
Effects of the oceans on polar motion: Extended investigations
[NASA-CR-179986] N87-15676
COEFFICIENTS
Identification of damping parameters of a squeeze-film bearing
[AD-A169678] N87-15470
COGNITION
Minimum points and views for the recovery of 3-dimensional structure
[AD-A171148] N87-15696
COLD PLASMAS
Instability in the system of counterstreaming relativistic plasmas N87-15867
COLD WORKING
Effect of cold-working by hole expansion on fatigue life of 7075-T7351 and 7475-T761 aluminum lugs with and without initial flaws under maneuver loading spectrum
[TAE-561] N87-15291
COLLAPSE
On low-hybrid turbulence excited by ion streams — plasma turbulence N87-15860
Acoustic wave collapse effect on the structure of collisionless shock waves in magnetized plasma N87-15861
COLLECTION
Digital simulation of the measured electrochemical response of reversible redox couples at microelectrode arrays: Consequences arising from closely spaced ultramicroelectrodes
[AD-A171181] N87-15425
COLLISION AVOIDANCE
Aircraft collision warning system
[AD-D012463] N87-15199
COLLISION PARAMETERS
The five deepest potential hypersurfaces of the CH2(+) ion. Description by continuous functions adapted to initial values
[MPIS-4/1986] N87-15781
COLLISIONAL PLASMAS
Instability in the system of counterstreaming relativistic plasmas N87-15867
COLLISIONLESS PLASMAS
Laboratory simulation of collisionless coupling between supernova remnants and magnetized interstellar medium N87-15798
Influence of reflected ions on the front structure of quasi-perpendicular collisionless shock waves N87-15829
Acoustic wave collapse effect on the structure of collisionless shock waves in magnetized plasma N87-15861

COLOR
The effects of response modality on interference between stimulus dimensions
[AD-A171177] N87-15697
Distributed control in computer networks and cross-sections of colored multidimensional bodies
[AD-A172224] N87-15740
COLOR INFRARED PHOTOGRAPHY
Experimental and theoretical approaches used at the National Aerospace Laboratory in Japan — turbine blade film cooling N87-15217
COLORADO
Modeling energy flow and nutrient cycling in natural semiarid grassland ecosystems with the aid of thematic mapper data
[NASA-CR-179903] N87-15517
Studies of stress and deformation in the Earth's crust: Part 1: Determining the state of stress in the Earth from earthquake focal mechanism data. Part 2: Deformation around the Creede Caldera, San Juan volcanic field, southwest Colorado: Implications for Caldera mechanics N87-15527
COMBINATORIAL ANALYSIS
Tight bounds for minimax grid matching, with applications to the average case analysis of algorithms
[AD-A171552] N87-15733
COMBUSTION
Application of Rayleigh scattering to turbulent flow with heat transfer and combustion
[AD-A172934] N87-15290
Inhalation toxicology. Part 7: Times to incapacitation and death for rats exposed continuously to atmospheric acrolein vapor
[AD-A169666] N87-15680
COMBUSTION CHAMBERS
Numerical simulations of the flowfield in a central-dump ramjet combustor. Part 1: Test of the model and effects of forcing
[AD-A170936] N87-15229
Method and apparatus for increasing service life of augmentor and combustion chamber liners
[AD-D012443] N87-15273
Pressure interactions in supersonic combustion
[AD-A172711] N87-15289
COMBUSTION CONTROL
The use of electrical discharge for ignition and control of combustion of solid propellants
[NASA-TM-88548] N87-15317
COMBUSTION STABILITY
Interactions of coupled acoustic and vortical instabilities in rocket combustion chambers N87-15266
COMETS
Mass loading and MHD turbulence in the solar wind/comet interaction region N87-15836
COMMERCIAL AIRCRAFT
Task force on emergency evacuation of transport airplanes. Volume 2: Supporting documentation
[AD-A172256] N87-15194
COMMUNICATION EQUIPMENT
Current status and expected developments in the area of satellite communications in the Latin American and Caribbean region
[NASA-TM-88000] N87-15395
Proceedings of the 40th Anniversary of the Joint Services Electronics Program
[AD-A171610] N87-15431
COMMUNICATION NETWORKS
VECOM: A powerful local communication channel between vehicle-borne and roadside systems N87-15367
Economic aspects of communication in road transport N87-15368
Data transmission: A key factor to the efficiency of the transport industry N87-15369
PRODAT system architecture — communication network N87-15371
The INMARSAT Standard-C service N87-15372
MSAT system and service description — mobile communications N87-15387
A communication bandwidth model for shuffle-exchange and augmented shuffle-exchange interprocessor communication networks
[AD-A171287] N87-15402
Computer facilities for high-speed data acquisition, signal processing and large scale system simulation
[AD-A170935] N87-15737
Randomized routing on fat trees
[AD-A171546] N87-15738
Distributed control in computer networks and cross-sections of colored multidimensional bodies
[AD-A172224] N87-15740
COMMUNICATION SATELLITES
Satellite communications — India N87-15251
Land mobile communications satellite N87-15363
COMPACTING
Spontaneous compactification of extra dimensions in eleven-dimensional quantum gravity
[DE86-702620] N87-15695
COMPARISON
A comparison of single-sideband, suppressed-carrier and double-sideband, full-carrier amplitude modulation
[P-7254] N87-15394
Field test to intercompare carbon monoxide, nitric oxide and hydroxyl instrumentation at Wallops Island, Virginia
[NASA-TM-87718] N87-15524
COMPENSATORY TRACKING
On the pilot's behavior of detecting a system parameter change
[NASA-TM-88479] N87-15695
COMPILERS
The power of the queue
[AD-A171536] N87-15732
COMPLEXITY
Diagonalization methods in a polynomial setting
[FVI-86-10] N87-15750
COMPOSITE MATERIALS
Investigation of the components of the NAL high Reynolds number two-dimensional wind tunnel. Part 4: Design, construction and performance of the exhaust silencer
[NASA-TM-88513] N87-15237
Finite element analysis of propagating interface cracks in composites N87-15276
Failure analysis of composite structure materials
[AD-A172236] N87-15279
COMPOSITE STRUCTURES
Failure analysis of composite structure materials
[AD-A172236] N87-15279
Composite piston
[NASA-CASE-LAR-13435-1] N87-15464
COMPRESSED GAS
Research on factors that affect the reliability of compressed gas insulated apparatus
[DE86-014417] N87-15437
COMPRESSIBILITY EFFECTS
Single-substance, two-phase duct flow: A unified theoretical and experimental study N87-15438
COMPRESSIBLE FLOW
An 1 sup (p) theory for the n-dimensional, stationary, compressible, Navier-Stokes equations, and the incompressible limit for compressible fluids. The equilibrium solutions
[AD-A172778] N87-15451
COMPTON EFFECT
Time dependent behavior of interstellar maser features due to stimulated scattering through dense plasma clouds N87-15838
Accreting pulsars: Some recent theoretical results N87-15857
COMPUTATION
Transonic controversy and regular perturbation methods for subcritical flows N87-15172
Development of upwind schemes for the Euler equations
[NASA-CR-4043] N87-15188
MOPAC manual (version 3.10): A general molecular orbital package, IBM-PC version, 1st edition
[AD-A172361] N87-15313
A single VLSI chip for computing syndromes in the (225, 223) Reed-Solomon decoder N87-15340
Irregular wavefronts in data-driven data-dependent computations
[AD-A171151] N87-15727
Nonsequential computation and laws of nature
[AD-A171505] N87-15731
COMPUTATIONAL FLUID DYNAMICS
AGARD Fluid Dynamics Panel Symposium on Applications of Computational Fluid Dynamics in Aeronautics: Proceedings
[NASA-TM-88356] N87-15181
Simulation codes for calculation of heat transfer to convectively-cooled turbine blades N87-15213
Hydrodynamics of film cooling — gas turbine blades N87-15219
A simple concept for the computation of steady supersonic flow with supply of heat N87-15224
Critical flows — liquids N87-15325
A locally implicit method for fluid flow problems
[NASA-CR-178989] N87-15443
Computational fluid dynamic studies of certain ducted bluff-body flowfields relevant to turbojet combustors. Volume 2: Time-averaged flowfield predictions for a proposed centerbody combustor
[AD-A171169] N87-15447
Grid generation for turbomachinery problems
[NASA-CR-178988] N87-15745
COMPUTATIONAL GRIDS
Two- and three-dimensional viscous computations of a hypersonic inlet flow
[NASA-TM-88923] N87-15441
A locally implicit method for fluid flow problems
[NASA-CR-178989] N87-15443
Tight bounds for minimax grid matching, with applications to the average case analysis of algorithms
[AD-A171552] N87-15733
GENESIS finite element mesh file format
[DE88-012740] N87-15735
Grid generation for turbomachinery problems
[NASA-CR-178988] N87-15745
COMPUTER AIDED DESIGN
Canard/Tail transonic analysis
[AD-A171075] N87-15189
Assessment of two fast codes used for preliminary aerodynamic design of guided projectiles
[AD-A171276] N87-15255
Design of a graphics user interface for a database management system
[AD-A171393] N87-15730
Defense Mapping Agency advanced raster-to-Vector benchmark testing
[AD-A171575] N87-15734
COMPUTER AIDED MAPPING
Contributions to geodesy, photogrammetry, and cartography, series 2, no. 44 — conference
[ISSN-0469-4244] N87-15498
Computer-assisted construction of a structural atlas of Switzerland N87-15499
Inertial surveying and the collection of data base information — road maps N87-15500
Transformation of the logic of a thematic map construction model to a user interface in automated cartography N87-15501
The differing requirements of producers and users of data and the design of topographic/cartographic databases N87-15502
Computer-aided production of thematic maps for traffic data N87-15504
Planning and control of map production and reproduction using computers N87-15505
Problems of digital automated mapping N87-15506
Automatic geometric correction after scanning — road mapping N87-15508
Data gathering: Cost/time considerations — cartography N87-15509
Map data requirement for civil land vehicle navigation and location synopsis N87-15511
A digital raster procedure for updating a topographic map N87-15512
Problems in establishing and updating a digital cartographic data base at the millionth scale N87-15513
COMPUTER GRAPHICS
A digital raster procedure for updating a topographic map N87-15512
Design of a graphics user interface for a database management system
[AD-A171393] N87-15730
Defense Mapping Agency advanced raster-to-Vector benchmark testing
[AD-A171575] N87-15734
COMPUTER NETWORKS
Computer networking — aerospace research N87-15250
A communication bandwidth model for shuffle-exchange and augmented shuffle-exchange interprocessor communication networks
[AD-A171287] N87-15402
Planning and control of map production and reproduction using computers N87-15505
Distributed control in computer networks and cross-sections of colored multidimensional bodies
[AD-A172224] N87-15740
Correctness conditions for highly available replicated databases
[AD-A171427] N87-15901
COMPUTER PROGRAM INTEGRITY
On the need to benchmark simulation codes — boundary layer flow N87-15214
Partial evaluation and omega-completeness of algebraic specifications. Annexe D5.A1 of deliverable D5 - second review — computer systems programs
[CWI-CS-R8501] N87-15721
COMPUTER PROGRAMMING
Canard/Tail transonic analysis
[AD-A171075] N87-15189
A rewrite rule machine. Programming by generic example
[AD-A171074] N87-15726
Artificial intelligence through evolutionary programming: Prediction and identification
[AD-A171544] N87-15741
COMPUTER PROGRAMS
TRANDESNF: A computer program for transonic airfoil design and analysis in nonuniform flow
[NASA-CR-4044] N87-15186

MOPAC manual (version 3.10): A general molecular orbital package, IBM-PC version, 1st edition
[AD-A172361] N87-15313
Survey of ergonomics databases in member countries of the international ergonomics association
[AD-A171142] N87-15701
GENESIS finite element mesh file format
[DE86-012740] N87-15735
Approaches to optimization/simulation problems
[DE86-012758] N87-15736
Grid generation for turbomachinery problems
[NASA-CR-178968] N87-15745

COMPUTER SYSTEMS DESIGN
Computer networking — aerospace research N87-15250
On-board processing payload technology for an European land mobile satellite system N87-15376
A digital raster procedure for updating a topographic map N87-15512
Global outline of an environment generation system. Deliverable D5 of task T5 - second review — computer programming N87-15720
Theory of non-first Norman form relational databases
[AD-A171285] N87-15729

COMPUTER SYSTEMS PERFORMANCE
Correctness conditions for highly available replicated databases
[AD-A171427] N87-15901

COMPUTER SYSTEMS PROGRAMS
Simulation codes for calculation of heat transfer to convectively-cooled turbine blades N87-15213
On the need to benchmark simulation codes — boundary layer flow N87-15214
A comparison of two window systems — computer user interfaces N87-15710

COMPUTER SYSTEMS SIMULATION
A communication bandwidth model for shuffle-exchange and augmented shuffle-exchange interprocessor communication networks
[AD-A171287] N87-15402
Computer facilities for high-speed data acquisition, signal processing and large scale system simulation
[AD-A170935] N87-15737

COMPUTER TECHNIQUES
An investigation of expert systems usage for software requirements development in the strategic defense initiative environment
[AD-A169659] N87-15724
A decentralized naming facility
[AD-A170937] N87-15725

COMPUTERIZED SIMULATION
Simulating the effects of curvature, free stream turbulence, and transition — heat transfer on gas turbine blades N87-15215
Simulation codes for calculation of heat transfer to film-cooled turbine blades N87-15216
Numerical simulations of the flowfield in a central-dump ramjet combustor. Part 1: Test of the model and effects of forcing
[AD-A170936] N87-15229
Assessment of two fast codes used for preliminary aerodynamic design of guided projectiles
[AD-A171276] N87-15255
Space Shuttle/TDRSS communication and tracking systems analysis
[NASA-CR-171948] N87-15391
Simulation of two-dimensional internal incompressible separated flows with heat transfer N87-15439
Signal processing in ultrasonic NDE (nondestructive evaluation)
[AD-A172687] N87-15475
Stress rates in continuum mechanics and computer codes
[AD-A172704] N87-15495
The effectiveness of Jackson networks as control variates for queueing network simulation
[AD-A171280] N87-15728
Approaches to optimization/simulation problems
[DE86-012758] N87-15736
Application of superconducting magnet energy storage to power system stabilizing control N87-15762
Emissivity as a function of surface roughness: A computer model
[AD-A172230] N87-15790
Adaptive modeling of the dynamics of autonomous land vehicles
[AD-A172404] N87-15911

CONCENTRATION (COMPOSITION)
OH measurement by laser light absorption N87-15531
Inhalation toxicology. Part 7: Times to incapacitation and death for rats exposed continuously to atmospheric acrolein vapor
[AD-A169666] N87-15680

CONCRETE STRUCTURES
Investigation of the components of the NAL high Reynolds number two-dimensional wind tunnel. Part 4: Design, construction and performance of the exhaust silencer
[NASA-TM-88513] N87-15237

CONCRETES
Facilities technology application tests: Fuel-resistant pavement sealers
[AD-A171473] N87-15238

CONDENSATES
Condensation polymers with controlled structure
[AD-A172283] N87-15311

CONDITIONING (LEARNING)
Attention and preparatory processes in the central nervous system
[AD-A171316] N87-15689

CONDUCTORS
Synthesis and characterization of new low-dimensional metal complex conductors
[AD-A172659] N87-15891

CONFERENCES
Convective Heat Transfer and Film Cooling in TurboMachinery — conference
[VKI-LS-1986-06] N87-15208
Colloquium about Joint Projects within the DFVLR/ISRO Cooperation
[DFVLR-MITT-86-16] N87-15240
Corrosion and stress corrosion of steel pressure boundary components and steam turbines
[DE86-780555] N87-15293
Two Phase Flows in Major Technological Hazards, volume 1 — conference
[VKI-LS-1986-03-VOL-1] N87-15321
Proceedings of an ESA Workshop on Land Mobile Services by Satellite
[ESA-SP-259] N87-15361
Contributions to geodesy, photogrammetry, and cartography, series 2, no. 44 — conference
[ISSN-0469-4244] N87-15498
Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference
[ESA-SP-248] N87-15544
Satellite Measurements of Radiation Budget of the Earth (3rd Symposium)
[BMFT-FB-W-86-011] N87-15630
Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics — conference
[ESA-SP-251] N87-15793

CONGRESSIONAL REPORTS
Investigation of the Challenger accident, volume 1
[GPO-64-295] N87-15256
H.R. 4932: To amend land remote sensing commercialization
[GPO-64-491] N87-15515
NASA authorizations, fiscal year 1987
[GPO-61-975] N87-15904
H.R. 4316 and H.R. 3112: Inventions in outer space
[GPO-64-526] N87-15905
Department of Housing and Urban Development, and certain independent agencies appropriations for fiscal year 1987, part 2
[S-HRG-99-707-PT-2] N87-15906
National Aeronautics and Space Administration N87-15907
National Aeronautics and Space Administration N87-15908

CONJUGATE GRADIENT METHOD
Iterative methods and preconditioning for solving large system of linear equations N87-15756

CONSTITUTIVE EQUATIONS
An endochronic rate-sensitive constitutive equation for metals: Application to generalized creep
[AD-A172705] N87-15298

CONTINUUM MECHANICS
Stress rates in continuum mechanics and computer codes
[AD-A172704] N87-15495

CONTROL SIMULATION
The effectiveness of Jackson networks as control variates for queueing network simulation
[AD-A171280] N87-15728

CONTROL STABILITY
Application of superconducting magnet energy storage to power system stabilizing control N87-15762

CONTROL SYSTEMS DESIGN
Formulation and minimality of nonlinear discrete time control systems N87-15233

CONTROL THEORY
Maximum-terminal-velocity guidance for a hypersonic glider N87-15202
Adaptive control of robotic manipulators N87-15700

CONTROLLABILITY
Flared landing approach flying qualities. Volume 1: Experiment design and analysis
[NASA-CR-178186-VOL-1] N87-15234

CONTROLLERS
Formulation and minimality of nonlinear discrete time control systems N87-15233
Control and simulation of a 3-jointed finger
[DE86-014303] N87-15469
Adaptive control of robotic manipulators N87-15700

CONVECTION
Natural convection of stably stratified fluid layer with uniform heating from below N87-15771
Energy dissipation and convective motors in the local MHD-resonance regions in solar chromosphere N87-15806

CONVECTIVE HEAT TRANSFER
Convective Heat Transfer and Film Cooling in TurboMachinery — conference
[VKI-LS-1986-06] N87-15208
Simulation codes for calculation of heat transfer to convectively-cooled turbine blades N87-15213
Simulating the effects of curvature, free stream turbulence, and transition — heat transfer on gas turbine blades N87-15215
Simulation codes for calculation of heat transfer to film-cooled turbine blades N87-15216
Hydrodynamics of film cooling — gas turbine blades N87-15219
Unsteady aerodynamic and heat transfer processes in a transonic turbine stage N87-15220
The effect of wake passing on turbine blades N87-15221

COOLING
A cooled avalanche photodiode with high photon detection probability N87-15334

COOLING SYSTEMS
Thermal analysis and design of a cooling system for a Mach 14 nozzle
[NASA-CR-180098] N87-15271

COORDINATE TRANSFORMATIONS
Transformation of the logic of a thematic map construction model to a user interface in automated cartography N87-15501

COORDINATES
Location finding using meteorological satellite images N87-15600

COPOLYMERIZATION
Process for curing bismaleimide resins
[NASA-CASE-ARC-11429-4] N87-15304

COPPER
Copper vapor lasers for isotope separation N87-15768

COPPER ALLOYS
Investigation of the elastic behavior of Al-Li-X alloys
[AD-A171224] N87-15295

CORIOLIS EFFECT
Investigation of subpulse drift in pulsars meaning the Coriolis force and inhomogeneities N87-15851

CORONAL LOOPS
Preflare acceleration by magnetic trapping in shearing arcades — solar flares N87-15811

CORRECTION
Defense Mapping Agency advanced raster-to-Vector benchmark testing
[AD-A171575] N87-15734

CORRELATION COEFFICIENTS
Correlative properties of self-exciting fluctuative magnetic fields — solar and galactic magnetic fields N87-15874

CORROSION
Metallurgical variables influencing the corrosion susceptibility of P/M (Powder Metallurgy) 7091 Aluminum/SiCw composite
[AD-A170946] N87-15294

COSMIC PLASMA
Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics — conference
[ESA-SP-251] N87-15793
Relativistic plasmas in active galactic nuclei N87-15794
The interaction of rotating magnetized stars with accreting plasma N87-15797
The critical ionization velocity phenomenon in astrophysics N87-15814
Radiative-resonant acceleration by plasma turbulence — cosmic plasma N87-15826
Very hot interstellar matter heated by a galactic shock wave N87-15828
Monte Carlo simulation of particle acceleration by shock waves — cosmic plasma N87-15830
Collective interactions of neutrinos with dense astrophysical plasmas N87-15837
Nonlinear conversion emission mechanisms in the open plasma systems in astrophysics N87-15840

Physics of pulsar magnetosphere N87-15844
Electron nonlinearities and rapid wave processes in cosmic and laboratory plasmas N87-15859
Magnetic field generation in celestial objects N87-15872

COSMIC RAYS
Cosmic ray archaeology, solar activity and supernova explosions N87-15831
The role of cosmic rays in supernovae shock dynamics N87-15832
Hydrodynamics of interstellar medium including cosmic rays N87-15833
Problems of cosmic ray acceleration in giant molecular clouds N87-15834
Injection mechanism for the cosmic ray acceleration by shocks N87-15835
Distortions of power-law of electrons in turbulent plasma reactor — decametric cosmic rays N87-15841

COSMOLOGY
The angular sizes of faint radio sources and their implications for cosmology N87-15930

COST ANALYSIS
Data gathering: Cost/time considerations — cartography N87-15509

COST EFFECTIVENESS
A cost-performance model for ground-based optical communications receiving telescopes N87-15336

COST ESTIMATES
Space station experiment definition: Advanced power system test bed
[NASA-CR-179502] N87-15270

COST REDUCTION
A digital raster procedure for updating a topographic map N87-15512

COUPLING
Interactions of coupled acoustic and vortical instabilities in rocket combustion chambers N87-15266
Automation of preparation of nonmetallic samples for analysis by atomic absorption and inductively coupled plasma spectrometry
[NASA-TM-88476] N87-15285

COVERINGS
The effect of long term monocular occlusion on vernier threshold: Elasticity in the young adult visual system
[AD-A171289] N87-15688

CRAB NEBULA
Wisps in the Crab Nebula N87-15854

CRACK INITIATION
Creep fatigue life prediction for engine hot section materials (ISOTROPIC)
[NASA-CR-179550] N87-15491

CRACK PROPAGATION
Finite element analysis of propagating interface cracks in composites N87-15276
Corrosion fatigue and electrochemical reactions in modified HY130 steel
[AD-A172242] N87-15296
Electrochemical reactions with bare metal surfaces and corrosion fatigue crack growth
[AD-A172248] N87-15297
Detecting and monitoring crack growth in austenitic and ferritic steels
[DE86-014348] N87-15299
High temperature monotonic and cyclic deformation in a directionally solidified nickel-base superalloy
[NASA-CR-175101] N87-15303
Fatigue crack propagation and fracture toughness of plasma arc welded Ti-6Al-4V alloy
[RAE-TR-85066] N87-15478
Fracture mechanics and creep crack growth in steel of the type 1%Cr0.5Mo, with or without preceeding exposure under creep crack circumstances N87-15488
Mechanics of shear rupture applied to earthquake zones
[NASA-CR-180070] N87-15663

CRACK TIPS
Effects of stress on the ultrasonic response of fatigue cracks
[AERE-R-10854] N87-15497

CRACKS
Finite element analysis of propagating interface cracks in composites N87-15276

CRANES
Space spider crane
[NASA-CASE-LAR-13411-1] N87-15259

CRASHES
Seat experiment results of full-scale transport aircraft controlled impact demonstration
[AD-A172245] N87-15193

CRATERING
Cratering mechanics
[NASA-TM-88477] N87-15662

CREEP PROPERTIES
An endochronic rate-sensitive constitutive equation for metals: Application to generalized creep
[AD-A172705] N87-15298
On cavitation and residual creep life N87-15758

CREEP STRENGTH
Assessment of creep loaded high temperature installations N87-15481
Evaluation of the Dutch Welding Institute (residual) life project N87-15489

CREEP TESTS
Replicas and structural analysis: Criteria for the reliability of creep-loaded installations N87-15484
Nondestructive methods for the inspection of creep-loaded installations N87-15486
Short term creep tests N87-15487

CRITICAL FLOW
Critical flows — liquids N87-15325

CRITICAL VELOCITY
The critical ionization velocity phenomenon in astrophysics N87-15814

CROP GROWTH
Modeling energy flow and nutrient cycling in natural semiarid grassland ecosystems with the aid of thematic mapper data
[NASA-CR-179903] N87-15517
An integrated system to assess agricultural productivity — satellite imagery N87-15621

CROP VIGOR
An integrated system to assess agricultural productivity — satellite imagery N87-15621

CROSS FLOW
An experimental investigation of a circular thrust augmenting ejector
[AD-A172376] N87-15231

CRUCIBLES
Automation of preparation of nonmetallic samples for analysis by atomic absorption and inductively coupled plasma spectrometry
[NASA-TM-88476] N87-15285

CRUSTAL FRACTURES
Crustal deformation in great California earthquake cycles
[NASA-CR-180059] N87-15655

CRYOGENIC EQUIPMENT
Evaluation of seals for high-performance cryogenic turbomachines
[NASA-TM-86919] N87-15442

CRYOGENIC ROCKET PROPELLANTS
Breadboard RL10-11B low thrust operating mode
[NASA-CR-174914] N87-15269

CRYOGENIC WIND TUNNELS
A simplified fourwall interference assessment procedure for airfoil data obtained in the Langley 0.3-meter transonic cryogenic tunnel
[NASA-CR-4042] N87-15187

CRYOGENICS
Development of NbN Josephson Junction technology
[AD-A171067] N87-15885

CRYSTAL DEFECTS
Transmission electron microscope and photoluminescence studies of ZnS crystalline films grown by low-pressure MOCVD N87-15766
Method for growing low defect, high purity crystalline layers utilizing lateral overgrowth of a patterned mask
[NASA-CASE-NPO-15813-2] N87-15882
Interatomic interactions in solids: An effective medium approach
[AD-A171518] N87-15887
Selective hydrogen passivation of oxygen-related thermal-donor clusters in silicon
[DE86-014718] N87-15894

CRYSTAL DISLOCATIONS
Observations of hierarchal grain boundary dislocation structures in 001 symmetric tilt boundaries in gold
[DE86-015729] N87-15301

CRYSTAL GROWTH
An overview of CVD processes
[NASA-TM-88450] N87-15283
Rugged, thin GaAs solar cell development, phase 1
[AD-A171188] N87-15520
Transmission electron microscope and photoluminescence studies of ZnS crystalline films grown by low-pressure MOCVD N87-15766
Method for growing low defect, high purity crystalline layers utilizing lateral overgrowth of a patterned mask
[NASA-CASE-NPO-15813-2] N87-15882
Preparation and characterization of several 2-4-V2 stannite single crystals
[AD-A172238] N87-15890
Synthesis and characterization of new low-dimensional metal complex conductors
[AD-A172659] N87-15891

CRYSTAL OSCILLATORS
High performance crystal oscillator development
[AD-A172631] N87-15433

CRYSTAL STRUCTURE
Laser-linewidth effects on the photon-phonon conversion rate at a gas-solid interfaces
[AD-A171469] N87-15886
Interatomic interactions in solids: An effective medium approach
[AD-A171518] N87-15887

CRYSTALLINITY
Method for growing low defect, high purity crystalline layers utilizing lateral overgrowth of a patterned mask
[NASA-CASE-NPO-15813-2] N87-15882

CRYSTALLIZATION
Chalcogenide glasses. Part 4: Crystallization and glass transition characteristics in AS(2-x)Sb(x)S(3) glass-forming system
[AD-A171564] N87-15310
Meteoritic basalts: The nakhlites, their parental magmas, cooling rates, and equivalents on Earth
[NASA-CR-180071] N87-15922

CUES
The effects of response modality on interference between stimulus dimensions
[AD-A171177] N87-15697

CURING
The use of microdielectrometry in monitoring the cure of carbon-epoxy prepreg
[AD-A172304] N87-15280
Process for curing bismaleimide resins
[NASA-CASE-ARC-11429-4] N87-15304
Dielectric analysis of the cure of thermosetting epoxy/amine systems
[AD-A171274] N87-15308

CURRENT DISTRIBUTION
Explosive coalescence of current loops and particle acceleration N87-15804

CURRENT SHEETS
The problem of the MHD flow near stagnation point of the current sheet — geomagnetism-solar wind N87-15817
Plasma outflow and superrotation in the Jovian magnetosphere deduced from Voyager observations N87-15924

CURVATURE
Simulating the effects of curvature, free stream turbulence, and transition — heat transfer on gas turbine blades N87-15215

CYCLES
An analysis method of strongly connected structure based on fundamental cycles N87-15761

CYCLONES
Utilization of VAS satellite data in the initialization of an oceanic-cyclogenesis simulation
[NASA-CR-180140] N87-15671

CYCLOTRON RADIATION
Radiation transfer and radiation pressure on plasma by magnetic degenerates — stellar radiation N87-15845

CYCLOTRON RESONANCE
Linear and nonlinear theory of the Doppler-shifted cyclotron resonance maser based on TE and TM waveguide modes
[AD-A172231] N87-15459
Radiative-resonant acceleration by plasma turbulence — cosmic plasma N87-15826

CYGNUS CONSTELLATION
Model of bimodal behavior of Cygnus X-1 N87-15875

CYLINDRICAL BODIES
Depolarization and scattering of electromagnetic waves
[AD-A171217] N87-15401
Supersonic flow over cylindrical afterbodies with base bleed
[AD-A171461] N87-15448

CZOCHRALSKI METHOD
Basic theory of diameter control in Czochralski growth using the melt-weighing technique
[DE86-752529] N87-15884
Characterization of infrared properties of layer semiconductors
[AD-A172692] N87-15893

D

DATA ACQUISITION
The Telecommunications and Data Acquisition Report
[NASA-CR-179938] N87-15329
Data gathering: Cost/time considerations — cartography N87-15509
Comparison of measured and modeled radiation, heat and water vapor fluxes: FIFE pilot study
[NASA-CR-179989] N87-15516
Hydrological studies in Niger N87-15609
User's guide to programming fault injection and data acquisition in the SIFT environment
[NASA-TM-87638] N87-15722
Defense Mapping Agency advanced raster-to-Vector benchmark testing
[AD-A171575] N87-15734

DATA BASE MANAGEMENT SYSTEMS
Design of a data base system for inferring land surface parameters and fluxes from satellite radiances N87-15625
A decision support system for space technology tradeoffs: A microcomputer application [AD-A172379] N87-15910
DATA BASES
The differing requirements of producers and users of data and the design of topographic/cartographic databases N87-15502
Problems in establishing and updating a digital cartographic data base at the millionth scale N87-15513
Global runoff data sets and use of geographic information systems N87-15570
Data needs and data bases for climate studies N87-15571
Survey of ergonomics databases in member countries of the international ergonomics association [AD-A171142] N87-15701
Theory of non-first Norman form relational databases [AD-A171285] N87-15729
Design of a graphics user interface for a database management system [AD-A171393] N87-15730
Correctness conditions for highly available replicated databases [AD-A171427] N87-15901
DATA CORRELATION
Verification of mesoscale objective analyses of VAS and rawinsonde data using the March 1982 AVE/VAS special network data [NASA-CR-179988] N87-15670
DATA LINKS
The unmanned air reconnaissance system [AD-A171165] N87-15206
Irregular wavefronts in data-driven data-dependent computations [AD-A171151] N87-15727
DATA MANAGEMENT
Quality assurance methods manual for experimental design and data management [DE86-015180] N87-15473
Global runoff data sets and use of geographic information systems N87-15570
Test processing system (SEE) [NASA-TM-88514] N87-15704
DATA PROCESSING
DSN microwave antenna holography. Part 2: Data processing and display of high-resolution effective maps N87-15339
Test processing system (SEE) [NASA-TM-88514] N87-15704
DATA PROCESSING TERMINALS
Implementation of a land mobile terminal for satellite data communication N87-15374
DATA RECORDERS
Small, self-contained aircraft fatigue data recorder [AD-A172400] N87-15207
DATA REDUCTION
New approach for calibration and interpretation of IRAD GAGE vibrating-wire stressmeters [DE86-010975] N87-15455
DATA SAMPLING
Temporal, spectral, and spatial samplings: Problem in radiation budget measurements — Earth radiation N87-15640
DATA SMOOTHING
Problems of the compensation calculation for the interferometry of spatial flows N87-15228
DATA STORAGE
A decentralized naming facility [AD-A170937] N87-15725
DATA TRANSMISSION
APC: A concept demonstration of end-to-end packetized data transportation techniques N87-15247
VECOM: A powerful local communication channel between vehicle-borne and roadside systems N87-15367
Data transmission: A key factor to the efficiency of the transport industry N87-15369
Implementation of a land mobile terminal for satellite data communication N87-15374
Printed circuit card hybrid [AD-D012448] N87-15428
Sporadic narrowband radio emissions from Uranus [AD-A170947] N87-15926
DEATH
Inhalation toxicology. Part 7: Times to incapacitation and death for rats exposed continuously to atmospheric acrolein vapor [AD-A169666] N87-15680
DECAMETRIC WAVES
Some interesting features in the drift pair phenomena of solar decametric radiation N87-15813
Distortions of power-law of electrons in turbulent plasma reactor — decametric cosmic rays N87-15841
DECISION MAKING
An investigation of expert systems usage for software requirements development in the strategic defense initiative environment [AD-A169659] N87-15724
Artificial intelligence through evolutionary programming: Prediction and identification [AD-A171544] N87-15741
An analysis method of strongly connected structure based on fundamental cycles N87-15761
A decision support system for space technology tradeoffs: A microcomputer application [AD-A172379] N87-15910
DECODERS
A single VLSI chip for computing syndromes in the (225, 223) Reed-Solomon decoder N87-15340
DECOMPOSITION
Study of the kinetics of catalytic decomposition of hydrazine vapors on palladium [NASA-TM-88549] N87-15286
DECOUPLING
Highly decoupled cosited antennas [AD-D012446] N87-15399
DEEP SPACE INSTRUMENTATION FACILITY
Block 2A traveling-wave maser N87-15346
Antenna servo control system characterization: Rate loop analysis for 34-m antenna at DSS 15 N87-15347
DEEP SPACE NETWORK
The Telecommunications and Data Acquisition Report [NASA-CR-179938] N87-15329
Relative performance of 8.5-GHz and 32-GHz telemetry links on the basis of total data return per pass N87-15337
DSN microwave antenna holography. Part 2: Data processing and display of high-resolution effective maps N87-15339
A single VLSI chip for computing syndromes in the (225, 223) Reed-Solomon decoder N87-15340
Table look-up estimation of signal and noise parameters from quantized observables N87-15341
A comparison of methods for DPLL loop filter design N87-15342
A generalized algorithm to design finite field normal basis multipliers N87-15343
X-band uplink feedcone capabilities, components, and layout N87-15344
A new algorithm for microwave delay estimation from water vapor radiometer data N87-15345
Block 2A traveling-wave maser N87-15346
Antenna servo control system characterization: Rate loop analysis for 34-m antenna at DSS 15 N87-15347
Software development for the VLA-GDSCC telemetry array project N87-15348
Real-time combiner loss N87-15349
PPM/NAR 8.4-GHz noise temperature statistics for DSN 64-meter antennas, 1982-1984 N87-15350
Rivited panel surface measurement using photogrammetry N87-15351
Pointing calibration of the MKIVA DSN antennas Voyager 2 Uranus encounter operations support N87-15352
Giotto mission support N87-15353
Giotto navigation support N87-15354
Pathfinder operations N87-15355
VEGA Pathfinder navigation for Giotto Halley encounter N87-15356
Selection of radio sources for Venus balloon-Pathfinder Delta-DOR navigation at 1.7 GHz N87-15357
ICE Second Halley radial: TDA mission support and DSN operations N87-15358
Propagation through Martian dust at 8.5 and 32 GHz N87-15359
Systolic VLSI for Kalman filters N87-15360
DEFECTS
The effects of implanted delaminations on the tensile strength of graphite/epoxy laminates [AD-A171329] N87-15278
Improvement of image quality of radiograph by means of narrow area radiation method N87-15760
DEFENSE PROGRAM
Systematic corporate planning at DTIC (Defense Technical Information Center) [AD-A171525] N87-15902
DEFORESTATION
The application of LANDSAT imagery for land cover assessment — Thailand N87-15614
DEFORMATION
An endochronic rate-sensitive constitutive equation for metals: Application to generalized creep [AD-A172705] N87-15298
High temperature monotonic and cyclic deformation in a directionally solidified nickel-base superalloy [NASA-CR-175101] N87-15303
Adhesion, friction, and deformation of ion-beam-deposited boron nitride films [NASA-TM-88902] N87-15305
Unstable deformation in layered media: Application to planetary lithospheres N87-15925
DEGRADATION
Carbon residue studies with a micro carbon residue tester [AD-A171153] N87-15306
Degradation in performance of adaptive null-steering antennas [AD-A169683] N87-15396
DEGREES OF FREEDOM
Signal-to-noise ratio requirements for detection of multiple pulses subject to partially correlated fading with chi-squared statistics of various degrees of freedom [AD-A172223] N87-15405
DELAMINATING
The effects of implanted delaminations on the tensile strength of graphite/epoxy laminates [AD-A171329] N87-15278
DELAY
A new algorithm for microwave delay estimation from water vapor radiometer data N87-15345
DELAY CIRCUITS
Delay modeling of bipolar ECL/EFL (Emitter-Coupled Logic/Emitter-Follower-Logic) circuits [AD-A171131] N87-15424
DELAY LINES
Investigation of magnetostatic surface waves for anisotropic effects [AD-A172375] N87-15774
DENSITY (MASS/VOLUME)
Cosmions and galaxy formation N87-15799
DENSITY DISTRIBUTION
Soviet research on the transport of intense relativistic electron beams through low-pressure air [AD-A172274] N87-15783
DENSITY WAVE MODEL
Cosmions and galaxy formation N87-15799
DEPOLARIZATION
Depolarization and scattering of electromagnetic waves [AD-A171217] N87-15401
DEPOSITION
Adhesion, friction, and deformation of ion-beam-deposited boron nitride films [NASA-TM-88902] N87-15305
DEPOSITS
Carbon residue studies with a micro carbon residue tester [AD-A171153] N87-15306
DESCENT
An evaluation of descent strategies for TNAV-equipped aircraft in an advanced metering environment [NASA-CR-178093] N87-15197
DESCRIPTIONS
Novice rules for assessing importance in scientific texts [AD-A171551] N87-15698
DESERTIFICATION
The use of aerial remote sensing in a case study of desertification: Quixaba-PE [INPE-3963-PRE/980] N87-15519
Remote sensing identified in climate model experiments with hydrological and albedo changes in the Sahel N87-15569
Desertification monitoring: Remotely sensed data for drought impact studies in the Sudan N87-15604
Regional studies with satellite data in Africa on the desertification of the Sudan-Sahel belt in Nigeria N87-15605
Systems approach to quantify desertifications processes using LANDSAT-MSS data N87-15613
Vegetation change and desertification in the Caribbean N87-15619
DESERTS
Parameterization of albedo, thermal inertia, and surface roughness of desert scrub/sandy soil surface N87-15557
Variation of skin temperature in desert regions in the neighbourhood of India in relation to Asian monsoon circulation N87-15620
DESIGN ANALYSIS
Applicability of linearized-theory attached-flow methods to design and analysis of flap systems at low speeds for thin swept wings with sharp leading edges [NASA-TP-2653] N87-15174
AGARD Fluid Dynamics Panel Symposium on Applications of Computational Fluid Dynamics in Aeronautics: Proceedings [NASA-TM-88356] N87-15181
TRANDESNF: A computer program for transonic airfoil design and analysis in nonuniform flow [NASA-CR-4044] N87-15186

Interdisciplinary and multilevel optimum design
[NASA-TM-89077] N87-15205
Thermal analysis and design of a cooling system for a Mach 14 nozzle
[NASA-CR-180098] N87-15271
Low heat transfer oxidizer heat exchanger design and analysis
[NASA-CR-179488] N87-15272
Design considerations for the beam-waveguide retrofit of a ground antenna station N87-15331

DETECTION
Small, self-contained aircraft fatigue data recorder
[AD-A172400] N87-15207
Detecting and monitoring crack growth in austenitic and ferritic steels
[DE86-014348] N87-15299
A cooled avalanche photodiode with high photon detection probability N87-15334
Stationary/slowly moving target detection in strong background clutter
[AD-A172225] N87-15406

DEUTERIUM
Inelastic gas-surface scattering. Part 2: Results
[AD-A171587] N87-15780

DEUTERIUM COMPOUNDS
The determination of the global average OH concentration using a deuteroethane tracer N87-15539

DIAMETERS
Basic theory of diameter control in Czochralski growth using the melt-weighing technique
[DE86-752529] N87-15884

DIELECTRIC PROPERTIES
The use of microdielectrometry in monitoring the cure of carbon-epoxy prepreg
[AD-A172304] N87-15280
Dielectric analysis of the cure of thermosetting epoxy/amine systems
[AD-A171274] N87-15308

DIELECTRICS
Dielectric analysis of the cure of thermosetting epoxy/amine systems
[AD-A171274] N87-15308
Basic equations and solution method for the calculation of the transient electromechanical response of dielectric devices
[DE86-012728] N87-15436

DIESEL FUELS
Development of referee fuels for improved Army multifuel engine design
[AD-A171143] N87-15318

DIFFRACTION
Effects of stress on the ultrasonic response of fatigue cracks
[AERE-R-10854] N87-15497

DIFFUSION ELECTRODES
Digital simulation of the measured electrochemical response of reversible redox couples at microelectrode arrays: Consequences arising from closely spaced ultramicroelectrodes, revision
[AD-A170943] N87-15423
Digital simulation of the measured electrochemical response of reversible redox couples at microelectrode arrays: Consequences arising from closely spaced ultramicroelectrodes
[AD-A171181] N87-15425
Digital simulation of the measured electrochemical response of reversible redox couples at microelectrode arrays: Consequences arising from closely spaced ultramicroelectrodes
[AD-A171272] N87-15427

DIFFUSION WELDING
Durability of structural adhesively bonded systems
[AD-A170708] N87-15492

DIGITAL COMPUTERS
Computer facilities for high-speed data acquisition, signal processing and large scale system simulation
[AD-A170935] N87-15737

DIGITAL FILTERS
Limit cycles in digital filters: A bibliography 1975-1984
[EUT-85-E-154] N87-15411

DIGITAL NAVIGATION
Map data requirement for civil land vehicle navigation and location synopsis N87-15511

DIGITAL SIMULATION
Digital simulation of the measured electrochemical response of reversible redox couples at microelectrode arrays: Consequences arising from closely spaced ultramicroelectrodes, revision
[AD-A170943] N87-15423
Digital simulation of the measured electrochemical response of reversible redox couples at microelectrode arrays: Consequences arising from closely spaced ultramicroelectrodes
[AD-A171181] N87-15425
Digital simulation of the measured electrochemical response of reversible redox couples at microelectrode arrays: Consequences arising from closely spaced ultramicroelectrodes
[AD-A171272] N87-15427

DIGITAL TECHNIQUES
Handbook. Volume 1: Validation of digital systems in avionics and flight control applications
[DOT/FAA/CT-82/115-VOL-1-REV] N87-15204
Problems of digital automated mapping N87-15506

DIMENSIONS
Spontaneous compactification of extra dimensions in eleven-dimensional quantum gravity
[DE86-702620] N87-15895

DISCRIMINANT ANALYSIS (STATISTICS)
Pairs of pulsars in the diagram P dot versus P N87-15856

DISK GALAXIES
Gas rotation above the galactic disk N87-15873

DISPERSING
Mathematical modeling and experimental investigation of heavier-than-air gas dispersion in the atmosphere N87-15526

DISPLAY DEVICES
DSN microwave antenna holography. Part 2: Data processing and display of high-resolution effective maps N87-15339
Large TV display system
[NASA-CASE-NPO-16932-1] N87-15413

DISSIPATION
Vortical dissipation in two-dimensional shear flows
[NASA-TM-89408] N87-15445

DISSOLVED GASES
A new approach to non-invasive oxygenated mixed venous PCO(sub)2
[NASA-CR-171949] N87-15682
Development of N(2) sensor for determination of PN(2) in body tissues
[AD-A171330] N87-15690

DISTRIBUTED PROCESSING
A decentralized naming facility
[AD-A170937] N87-15725
Nonsequential computation and laws of nature
[AD-A171505] N87-15731
Distributed control in computer networks and cross-sections of colored multidimensional bodies
[AD-A172224] N87-15740
Correctness conditions for highly available replicated databases
[AD-A171427] N87-15901

DIURNAL VARIATIONS
Effects of regional-scale diurnal variations on the radiation balance of the Earth-atmosphere system N87-15634

DOCUMENTS
Computer-assisted construction of a structural atlas of Switzerland N87-15499

DOPED CRYSTALS
Electrical conductivity and carrier mobility in polyphenylacetylene and polychlorophenylacetylene and their doping effect N87-15764
Photoinduced effects in polythiophene film N87-15765

DOPPLER EFFECT
Linear and nonlinear theory of the Doppler-shifted cyclotron resonance maser based on TE and TM waveguide modes
[AD-A172231] N87-15459
The angular sizes of faint radio sources and their implications for cosmology N87-15930

DOSAGE
Inhalation toxicology. Part 7: Times to incapacitation and death for rats exposed continuously to atmospheric acrolein vapor
[AD-A169666] N87-15680

DOUBLE SIDEBAND TRANSMISSION
A comparison of single-sideband, suppressed-carrier and double-sideband, full-carrier amplitude modulation
[P-7254] N87-15394

DOWNLINKING
Received optical power calculations for optical communications link performance analysis N87-15333

DRAG
Lageos orbit decay due to infrared radiation from Earth
[NASA-TM-87804] N87-15665

DRAINAGE
Global runoff data sets and use of geographic information systems N87-15570

DRIFT RATE
Some interesting features in the drift pair phenomena of solar decametric radiation N87-15813
Intense and short pulse electric field (dc and microwave) air breakdown parameters
[AD-A172227] N87-15878

DROPS (LIQUIDS)
Apparatus for determining the liquid water content of a gas
[AD-D012453] N87-15288

DROUGHT
African drought: An example of the influence of land-surface properties on climate N87-15602
The Sahel droughts: 1941-1984 N87-15603
Desertification monitoring: Remotely sensed data for drought impact studies in the Sudan N87-15604
Regional studies with satellite data in Africa on the desertification of the Sudan-Sahel belt in Nigeria N87-15605
Toward a drought-oriented climatic prediction system in Western Sudan N87-15606

DUCTED BODIES
Computational fluid dynamic studies of certain ducted bluff-body flowfields relevant to turbojet combustors. Volume 2: Time-averaged flowfield predictions for a proposed centerbody combustor
[AD-A171169] N87-15447

DUCTED FLOW
Single-substance, two-phase duct flow: A unified theoretical and experimental study N87-15438

DUCTED ROCKET ENGINES
Pressure interactions in supersonic combustion
[AD-A172711] N87-15269

DUCTILITY
Structure as a criterion for high temperature ductility N87-15485

DURABILITY
Durability of structural adhesively bonded systems
[AD-A170708] N87-15492

DUST
Development of instrumentation to measure sound speed and flow direction in dusty flow fields
[AD-A171050] N87-15453
Ground based atmospheric extinction measurement in the Sahel — satellite monitoring N87-15597

DUST STORMS
Propagation through Martian dust at 8.5 and 32 GHz N87-15359

DYE LASERS
Intense excitation source of blue-green laser
[AD-A172660] N87-15460

DYNAMIC CHARACTERISTICS
MOPAC manual (version 3.10): A general molecular orbital package, IBM-PC version, 1st edition
[AD-A172361] N87-15313
Cloud cavitation and collective bubble dynamics
[AD-A170692] N87-15446

DYNAMIC MODELS
Seat experiment results of full-scale transport aircraft controlled impact demonstration
[AD-A172245] N87-15193
Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference
[ESA-SP-248] N87-15544
WCRP (World Climate Research Program) on Land Surface Processes and Climate: Objectives and requirements N87-15546
The atmospheric boundary layer and its parameterization N87-15548
Boundary layer parameterizations and land surface processes in GFDL GCMS — Geophysical Fluid Dynamics Laboratory General Circulation Models (GFDL CGMs N87-15549
Land-surface parameterization in the Japan Meteorological Agency (JMA) operational spectral model N87-15551
Treatment of land-surface properties in the ECMWF model — European Center for Medium Range Weather Forecasts (ECMWF) N87-15552
The initialization and use of prognostic land-surface values in the French operational forecast system — weather forecasting N87-15553
A boundary layer and soil moisture for use in GCMs — General Circulation Models (GCM) N87-15555
Issues concerning the evaluation of effective surface roughness of heterogeneous terrain N87-15556
GCM sensitivity studies: Implications for parameterizations of land processes — General Circulation Models (GCM) N87-15561
Zero-D sensitivity studies with the NCAR CCM land surface parameterization scheme — Community Climate Model (CCM) N87-15562
The sensitivity of the UK Meteorological Office atmospheric general circulation model to recent changes to the parameterization of hydrology N87-15564
The sensitivity experiment to land-surface boundary conditions with the Meteorological Research Institute General Circulation Model (MRI GCM) N87-15565
Vegetation index and surface temperature in a mesoscale climate model — Alps N87-15592
Hydrological atmospheric pilot experiment (HAPEX) 86 N87-15627

DYNAMIC RESPONSE
A model for predicting thermomechanical response of large space structures
[AD-A172966] N87-15264
Adaptive modeling of the dynamics of autonomous land vehicles
[AD-A172404] N87-15911
DYNAMIC STRUCTURAL ANALYSIS
Dynamic testing of a two-dimensional box truss beam
[NASA-CR-4039] N87-15262
DYNAMO THEORY
The nonlinear turbulent dynamo in the accretion disks of black holes N87-15869
Magnetic field generation in celestial objects N87-15872
Correlative properties of self-exciting fluctuative magnetic fields — solar and galactic magnetic fields N87-15874

E

EARTH ALBEDO
Sensitivity of the annual cycle simulated by a General Circulation Model (GCM) to a change in land surface albedo N87-15563
Remote sensing identified in climate model experiments with hydrological and albedo changes in the Sahel N87-15569
Surface radiation budget for climate applications N87-15575
Estimation of surface albedo using satellite data. A simple formulation for atmospheric effects N87-15579
On the influence of surface characteristics from satellite radiation measurements N87-15580
Determination of the albedo of inhomogeneous land surfaces N87-15582
Surface albedo change in arid regions in the Sudan N87-15615
Variation in surface albedo and energy-balance in an arctic/subarctic environment N87-15616
Preliminary results of anthropogenic albedo changes over the past 15 years in Eastern Canada N87-15617
Influence of multiple cloud layers on planetary albedo N87-15635
Derivation of surface properties from satellite observations N87-15642
Errors and uncertainties in satellite derived albedo — Meteosat N87-15643
The effect of viewing aspect on climatological cloud distribution
[AD-A170440] N87-15672
EARTH CRUST
Studies of stress and deformation in the Earth's crust: Part 1: Determining the state of stress in the Earth from earthquake focal mechanism data. Part 2: Deformation around the Creede Caldera, San Juan volcanic field, southwest Colorado: Implications for Caldera mechanics N87-15527
Unstable deformation in layered media: Application to planetary lithospheres N87-15925
EARTH MANTLE
Unstable deformation in layered media: Application to planetary lithospheres N87-15925
EARTH RADIATION BUDGET
Surface radiation budget for climate applications N87-15575
Solar irradiance at the Earth's surface from NOAA satellites N87-15577
EARTH RADIATION BUDGET EXPERIMENT
Satellite Measurements of Radiation Budget of the Earth (3rd Symposium)
[BMFT-FB-W-86-011] N87-15630
Effects of regional-scale diurnal variations on the radiation balance of the Earth-atmosphere system N87-15634
Radiation budget variations caused by thin cirrus N87-15636
Temporal, spectral, and spatial samplings: Problem in radiation budget measurements — Earth radiation N87-15640
An approach to derive the radiation budget over the Sahara N87-15641
Effect of measured aerosol absorption on the radiation budget N87-15648
The correlation between the physico-chemical and optical properties of tropospheric aerosols with regard to the radiation budget (POETA) program N87-15647
EARTH ROTATION
Earth rotation polar motion and climatology N87-15601
EARTH SURFACE
Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference
[ESA-SP-248] N87-15544
Two years of the International Satellite Land-Surface Climatology Project (ISLSCP) N87-15545
WCRP (World Climate Research Program) on Land Surface Processes and Climate: Objectives and requirements N87-15546
Hydrologic models of land surface processes — soil moisture N87-15547
Boundary layer parameterizations and land surface processes in GFDL GCMS — Geophysical Fluid Dynamics Laboratory General Circulation Models (GFDL CGMs N87-15549
Land-surface parameterization in the Japan Meteorological Agency (JMA) operational spectral model N87-15551
Treatment of land-surface properties in the ECMWF model — European Center for Medium Range Weather Forecasts (ECMWF) N87-15552
Zero-D sensitivity studies with the NCAR CCM land surface parameterization scheme — Community Climate Model (CCM) N87-15562
Sensitivity of the annual cycle simulated by a General Circulation Model (GCM) to a change in land surface albedo N87-15563
The sensitivity experiment to land-surface boundary conditions with the Meteorological Research Institute General Circulation Model (MRI GCM) N87-15565
Evaluation of climate relevant land surface characteristics from remote sensing N87-15572
Remote sensing of land-surface temperature from HIRS/MSU data — High Resolution Infrared Sounder/Microwave Sounding Unit (HIRS/MSU) N87-15573
Surface temperature from AVHRR and TOVS from the meteorological satellite NOAA 9 N87-15574
Surface radiation budget for climate applications N87-15575
Inference of the shortwave radiation at ground from international Satellite Cloud Climatology Project (ISCCP) data sets N87-15576
Solar irradiance at the Earth's surface from NOAA satellites N87-15577
Downward longwave radiation at the surface in clear-sky atmospheres: Comparisons of measured, satellite-derived, and calculated fluxes N87-15578
Estimation of surface albedo using satellite data. A simple formulation for atmospheric effects N87-15579
On the influence of surface characteristics from satellite radiation measurements N87-15580
Determination of the albedo of inhomogeneous land surfaces N87-15582
Estimation of regional evaporation using midday surface temperature from satellite thermal IR data N87-15591
African drought: An example of the influence of land-surface properties on climate N87-15602
Design of a data base system for inferring land surface parameters and fluxes from satellite radiances N87-15625
Future European plans in the framework of the International Satellite Land Surface Climatology Project (ISLSCP) N87-15628
The first International Satellite Land Surface Climatology Project (ISLSCP) Field Experiment - FIFE N87-15629
Global and atmospheric radiation at ground from satellite data N87-15637
Short wave radiative fluxes at surface from NOAA satellites N87-15638
Astroblemes on trapp rock: Structural features and differences from impact structures on other targets
[NASA-TM-88484] N87-15921
EARTHQUAKES
Studies of stress and deformation in the Earth's crust: Part 1: Determining the state of stress in the Earth from earthquake focal mechanism data. Part 2: Deformation around the Creede Caldera, San Juan volcanic field, southwest Colorado: Implications for Caldera mechanics N87-15527
Crustal deformation in great California earthquake cycles
[NASA-CR-180059] N87-15655
Strain accumulation and surface deformation along the San Andreas, California
[NASA-CR-180058] N87-15657
Mechanics of shear rupture applied to earthquake zones
[NASA-CR-180070] N87-15663
ECONOMIC ANALYSIS
Land mobile communications satellite N87-15363
ECONOMIC FACTORS
Economic aspects of communication in road transport N87-15368
ECOSYSTEMS
Modeling energy flow and nutrient cycling in natural semiarid grassland ecosystems with the aid of thematic mapper data
[NASA-CR-179903] N87-15517
EDITING
Defense Mapping Agency advanced raster-to-Vector benchmark testing
[AD-A171575] N87-15734
EDITING ROUTINES (COMPUTERS)
Syntax directed editing of LeLISP. Annexe D1.A3 of deliverable D1 - second review N87-15711
EDUCATION
Space mathematics: A resource for secondary school teachers
[NASA-EP-175] N87-15742
EFFICIENCY
An efficient algorithm for solution of the unsteady transonic small-disturbance equation
[NASA-TM-89014] N87-15176
Relative performance of 8.5-GHz and 32-GHz telemetry links on the basis of total data return per pass N87-15337
Digital simulation of the measured electrochemical response of reversible redox couples at microelectrode arrays: Consequences arising from closely spaced ultramicroelectrodes
[AD-A171181] N87-15425
EGYPT
Assessment of wind and fluvial action by using LANDSAT-MSS color composites in the lower Nile Valley (Egypt) N87-15612
EIGENVALUES
Optimization of closed loop eigenvalues: Manauvering, vibration control and structure/control design iteration for flexible spacecraft
[AD-A172716] N87-15263
ELASTIC DEFORMATION
Experimental investigations with notched samples of elastic-plastic materials behavior
[W-2/84] N87-15496
ELASTIC MEDIA
Vector image method for the derivation of elastostatic solutions for point sources in a plane layered medium. Part 1: Derivation and simple examples
[NASA-CR-180062] N87-15743
Image method for the derivation of point sources in elastostatic problems with plane interfaces
[NASA-CR-180060] N87-15744
ELASTIC PROPERTIES
Investigation of the elastic behavior of Al-Li-X alloys
[AD-A171224] N87-15295
Stress rates in continuum mechanics and computer codes
[AD-A172704] N87-15495
ELASTIC SCATTERING
Seventh International Summer Institute in Surface Science
[AD-A171449] N87-15287
Ultrasonic scattering and nondestructive evaluation of defects
[AD-A172258] N87-15494
ELASTOMERS
Coaxial cable connector
[NASA-CASE-NPO-16764-1] N87-15414
ELASTOSTATICS
Vector image method for the derivation of elastostatic solutions for point sources in a plane layered medium. Part 1: Derivation and simple examples
[NASA-CR-180062] N87-15743
Image method for the derivation of point sources in elastostatic problems with plane interfaces
[NASA-CR-180060] N87-15744
ELECTRIC BATTERIES
Cathode including a non fluorinated linear chain polymer as the binder, method of making the cathode, and lithium electrochemical cell containing the cathode
[AD-D012464] N87-15429
Effects of phosphoric acid on the lead-acid battery reactions N87-15772
ELECTRIC CONDUCTORS
International Aerospace and Ground Conference on Lightning and Static Electricity. Technical papers: The key to lightning technology, held in Orlando, Florida on 26-28 June 1984
[AD-A169867] N87-15192
ELECTRIC CONNECTORS
Coaxial cable connector
[NASA-CASE-NPO-16764-1] N87-15414
ELECTRIC DISCHARGES
The use of electrical discharge for ignition and control of combustion of solid propellants
[NASA-TM-86548] N87-15317
Research for electric energy systems
[DE86-012716] N87-15435
ELECTRIC FIELDS
Shuttle contamination modeling: Evolution of ionized shuttle exhaust, environmental research papers
[AD-A172276] N87-15257
Research for electric energy systems
[DE86-012716] N87-15435

Basic equations and solution method for the calculation of the transient electromechanical response of dielectric devices
[DE86-012728] N87-15436
Intense and short pulse electric field (dc and microwave) air breakdown parameters
[AD-A172227] N87-15878

ELECTRIC PULSES
Intense and short pulse electric field (dc and microwave) air breakdown parameters
[AD-A172227] N87-15878

ELECTRIC WIRE
Radiation resistance of thin antennas of arbitrary elevation and configuration over perfectly conducting ground
[AD-A170945] N87-15397

ELECTRICAL ENGINEERING
Computer facilities for high-speed data acquisition, signal processing and large scale system simulation
[AD-A170835] N87-15737
Technology Reports of the Osaka University, volume 36, nos. 1844-1864
[ISSN-0030-6177] N87-15754

ELECTRICAL GROUNDING
International Aerospace and Ground Conference on Lightning and Static Electricity. Technical papers: The key to lightning technology, held in Orlando, Florida on 26-28 June 1984
[AD-A169867] N87-15192
Radiation resistance of thin antennas of arbitrary elevation and configuration over perfectly conducting ground
[AD-A170945] N87-15397

ELECTRICAL INSULATION
Coaxial cable connector
[NASA-CASE-NPO-16764-1] N87-15414
Induced insulator voltage in transmitter antenna guy cables
[AD-A169656] N87-15417
Research on factors that affect the reliability of compressed gas insulated apparatus
[DE86-014417] N87-15437

ELECTRICAL PROPERTIES
Preparation and characterization of several 2-4-V2 stannite single crystals
[AD-A172236] N87-15890
Selective hydrogen passivation of oxygen-related thermal-donor clusters in silicon
[DE86-014718] N87-15894

ELECTRICAL RESISTANCE
Radiation resistance of thin antennas of arbitrary elevation and configuration over perfectly conducting ground
[AD-A170945] N87-15397

ELECTRICAL RESISTIVITY
Electrical conductivity and carrier mobility in polyphenylacetylene and polychlorophenylacetylene and their doping effect N87-15764
Synthesis and characterization of new low-dimensional metal complex conductors
[AD-A172659] N87-15891

ELECTRO-OPTICAL PHOTOGRAPHY
Status of launch vehicle, satellite and mission related activities for MEOSS — Mono Electro-Optical Stereo Scanner (MEOSS) N87-15244
Presentation of the status of the experiment Monocular Electro-Optical Stereo Scanner (MEOSS) N87-15245

ELECTRO-OPTICS
Research for electric energy systems
[DE86-012716] N87-15435
Integrated optic modules for multichannel deflection/switching and signal processing
[AD-A171178] N87-15789

ELECTROCHEMICAL CELLS
Cathode including a non fluorinated linear chain polymer as the binder, method of making the cathode, and lithium electrochemical cell containing the cathode
[AD-D012464] N87-15429

ELECTROCHEMICAL CORROSION
Corrosion fatigue and electrochemical reactions in modified HY130 steel
[AD-A172242] N87-15296
Electrochemical reactions with bare metal surfaces and corrosion fatigue crack growth
[AD-A172248] N87-15297

ELECTROCHEMICAL OXIDATION
Corrosion fatigue and electrochemical reactions in modified HY130 steel
[AD-A172242] N87-15296
Synthesis and characterization of new low-dimensional metal complex conductors
[AD-A172659] N87-15891

ELECTROCHEMISTRY
An investigation of the electrode kinetics and electrochemistry of refractory metal deposition
[AD-A171410] N87-15328
Digital simulation of the measured electrochemical response of reversible redox couples at microelectrode arrays: Consequences arising from closely spaced ultramicroelectrodes, revision
[AD-A170943] N87-15423
Digital simulation of the measured electrochemical response of reversible redox couples at microelectrode arrays: Consequences arising from closely spaced ultramicroelectrodes
[AD-A171181] N87-15425
Digital simulation of the measured electrochemical response of reversible redox couples at microelectrode arrays: Consequences arising from closely spaced ultramicroelectrodes
[AD-A171272] N87-15427
PH sensitive WO3-Based microelectrochemical transistors
[AD-A172563] N87-15432
Modification of microelectrode arrays: New microelectrochemical devices for sensor applications
[AD-A171180] N87-15454

ELECTRODES
An investigation of the electrode kinetics and electrochemistry of refractory metal deposition
[AD-A171410] N87-15328
Study of nickel hydroxide electrodes. 2: Oxidation products of nickel (2) hydroxides
[NASA-TM-86473] N87-15416
PH sensitive WO3-Based microelectrochemical transistors
[AD-A172563] N87-15432
Intracortical interactions in visual processing
[AD-A169674] N87-15684

ELECTROENCEPHALOGRAPHY
Attention and preparatory processes in the central nervous system
[AD-A171316] N87-15689

ELECTROHYDRODYNAMICS
Electrodynamics of inhomogeneous relativistic electron-positron plasma and radio emission of pulsars N87-15850
Output energy in pulsars N87-15853
Pulsar electrodynamics: Magnetospheres and radiation by magnetospheric plasma N87-15855

ELECTROLYTES
An investigation of the electrode kinetics and electrochemistry of refractory metal deposition
[AD-A171410] N87-15328
Effects of phosphoric acid on the lead-acid battery reactions N87-15772

ELECTROLYTIC CELLS
Cathode including a non fluorinated linear chain polymer as the binder, method of making the cathode, and lithium electrochemical cell containing the cathode
[AD-D012464] N87-15429

ELECTROMAGNETIC ABSORPTION
OH measurement by laser light absorption N87-15531

ELECTROMAGNETIC FIELDS
Induced insulator voltage in transmitter antenna guy cables
[AD-A169656] N87-15417
A theoretical study of the electromagnetic fields in a limb, excited by artificial sources
[EUT-86-E-156] N87-15694

ELECTROMAGNETIC INTERFERENCE
Model of a shaped-beam emission pattern of a satellite antenna for interference analysis
[PB86-238755] N87-15410

ELECTROMAGNETIC MEASUREMENT
Electromagnetic sensor arrays for nondestructive evaluation and robot control
[AD-A171128] N87-15474

ELECTROMAGNETIC NOISE
Josephson effect detectors of microwave and far infrared radiation
[AD-A171539] N87-15889

ELECTROMAGNETIC PULSES
An experimental and theoretical study of nuclear-EMP (electromagnetic pulse)-type lightning simulators with combined peaking capacitor and crowbar
[AD-A172648] N87-15407
Study of transient phonon dynamics
[AD-A172691] N87-15892

ELECTROMAGNETIC RADIATION
The secret of guided missile re-entry
[AD-A169598] N87-15254

ELECTROMAGNETIC SCATTERING
Investigation of the UHF mobile-radio propagation channel in a temperate-zone forested environment
[AD-A171431] N87-15403
Investigation of millimeter wave propagation in the atmosphere
[AD-A171526] N87-15404

ELECTRON ACCELERATION
Auroral electron acceleration by lower-hybrid waves
[DE86-703346] N87-15658

ELECTRON BUNCHING
Radiation produced by the modulated electron beam of a free electron laser
[AD-A171168] N87-15457

ELECTRON DENSITY (CONCENTRATION)
The application of laser saturation to the efficient generation of short wavelength radiation from plasmas
[AD-A172945] N87-15462
Interatomic interactions in solids: An effective medium approach
[AD-A171518] N87-15887

ELECTRON ENERGY
Revision of the theory of gradient solitons — plasma drift N87-15865

ELECTRON GUNS
Research program on a compact and high-power microwave tube
[AD-A171567] N87-15430

ELECTRON MICROSCOPY
Transmission electron microscope and photoluminescence studies of ZnS crystalline films grown by low-pressure MOCVD N87-15766

ELECTRON PARAMAGNETIC RESONANCE
Effect of light-soaking on electronic properties of glow-discharged hydrogenated amorphous silicon N87-15763
Photoinduced effects in polythiophene film N87-15765

ELECTRON PLASMA
Electron nonlinearities and rapid wave processes in cosmic and laboratory plasmas N87-15859

ELECTRON SCATTERING
Seventh International Summer Institute in Surface Science
[AD-A171449] N87-15287

ELECTRON STATES
Study of transient phonon dynamics
[AD-A172691] N87-15892

ELECTRON TUNNELING
Seventh International Summer Institute in Surface Science
[AD-A171449] N87-15287

ELECTRONIC COUNTERMEASURES
Investigation of magnetostatic surface waves for anisotropic effects
[AD-A172375] N87-15774

ELECTRONS
Auroral electron acceleration by lower-hybrid waves
[DE86-703346] N87-15658

ELECTROPHYSICS
Proceedings of the 40th Anniversary of the Joint Services Electronics Program
[AD-A171610] N87-15431

ELECTROPLATING
An investigation of the electrode kinetics and electrochemistry of refractory metal deposition
[AD-A171410] N87-15328

ELEMENTARY PARTICLES
Topics in cosmology and particle physics
[DE86-014830] N87-15923

ELLIPTICAL GALAXIES
Equilibrium and stability of galaxies in binary systems N87-15796

ELLIPTICAL ORBITS
Land mobile satellite systems using highly eccentric orbits N87-15389

EMBEDDING
Efficient solutions to the Euler equations for supersonic flow with embedded subsonic regions
[NASA-TP-2523] N87-15183

EMERGENCIES
Task force on emergency evacuation of transport airplanes. Volume 2: Supporting documentation
[AD-A172256] N87-15194

EMISSION SPECTRA
Seventh International Summer Institute in Surface Science
[AD-A171449] N87-15287
Investigation into alternative statistical auroral oval models, stage 1
[NASA-CR-180061] N87-15656
X-ray spectroscopy with Z-pinch neon plasmas
[AD-A172228] N87-15879

EMISSIVITY
Emissivity as a function of surface roughness: A computer model
[AD-A172230] N87-15790

ENERGY ABSORPTION
Inelastic gas-surface scattering. Part 2: Results
[AD-A171587] N87-15780
Calculations of heat deposition in a target system bombarded by high energy charged particles
[DE86-700263] N87-15784

ENERGY BANDS
Tailorable infrared sensing device with strain layer superlattice structure
[NASA-CASE-NPO-18607-1] N87-15683

ENERGY BUDGETS
The fundamental problems for the energy balance study by satellite imagery N87-15590
Variation in surface albedo and energy-balance in an arctic/subarctic environment N87-15616

ENERGY DISSIPATION
Energy dissipation and convective motors in the local MHD-resonance regions in solar chromosphere N87-15806
Magnetic energy dissipation in a rarefied plasma by the relaxation process — solar corona N87-15824
Nonlinear conversion emission mechanisms in the open plasma systems in astrophysics N87-15840

ENERGY GAPS (SOLID STATE)
Digital simulation of the measured electrochemical response of reversible redox couples at microelectrode arrays: Consequences arising from closely spaced ultramicroelectrodes
[AD-A171181] N87-15425
Electrical conductivity and carrier mobility in polyphenylacetylene and polychlorophenylacetylene and their doping effect N87-15764

ENERGY STORAGE
Application of superconducting magnet energy storage to power system stabilizing control N87-15762

ENERGY TRANSFER
Gas particle radiator
[NASA-CASE-LEW-14297-1] N87-15452
Determination of the longwave surface net flux from radiances to space N87-15648

ENGINE ANALYZERS
Experimental short-duration techniques — gas turbine engine tests N87-15209

ENGINE DESIGN
Low heat transfer oxidizer heat exchanger design and analysis
[NASA-CR-179488] N87-15272
Development of referee fuels for improved Army multifuel engine design
[AD-A171143] N87-15318

ENGINE PARTS
Composite piston
[NASA-CASE-LAR-13435-1] N87-15464

ENGINE TESTING LABORATORIES
Experimental short-duration techniques — gas turbine engine tests N87-15209
The National Gas Turbine projects in Japan. The FJR-710 turbofan engine project. The ADTJ-100 high efficient gas turbine project N87-15218

ENGINE TESTS
Breadboard RL10-11B low thrust operating mode
[NASA-CR-174914] N87-15269

ENTROPY (STATISTICS)
The role for entropy and information in software reliability
[BAE-ST-30581] N87-15706

ENVIRONMENT EFFECTS
On changes in soil moisture in CO2 climate studies N87-15568
Evaluation of climate relevant land surface characteristics from remote sensing N87-15572
The Sahel droughts: 1941-1984 N87-15603
The use of remote sensing techniques in the study of vegetation recovery after fire in mediterranean countries (a preliminary study) N87-15623

ENVIRONMENT MANAGEMENT
The creation of an environmental information system for the European Community N87-15510

ENVIRONMENT SIMULATION
Corrosion fatigue and electrochemical reactions in modified HY130 steel
[AD-A172242] N87-15296

EPHEMERIDES
Thermosphere structure variations during high solar and magnetic activity conditions
[AD-A171350] N87-15666

EPIDEMIOLOGY
Exploratory study of the potential effects of exposure to sonic boom on human health. Volume 2: Epidemiological study
[AD-A170953] N87-15686

EPITAXY
Characterization of infrared properties of layer semiconductors
[AD-A172692] N87-15893

EQUATIONS OF MOTION
Perturbation solutions of the equations of motion for a class of dual-spin spacecraft N87-15258

EQUATIONS OF STATE
A locally implicit method for fluid flow problems
[NASA-CR-178969] N87-15443

EQUILIBRIUM FLOW
A simple concept for the computation of steady supersonic flow with supply of heat N87-15224

EQUIPMENT SPECIFICATIONS
Experimental evaluation of the ring focus test for X-ray telescopes using AXAF's technology mirror assembly, MSFC CDDF Project No. H20
[NASA-TM-86570] N87-15916

EQUIVALENT CIRCUITS
Delay modeling of bipolar ECL/EFL (Emitter-Coupled Logic/Emitter-Follower-Logic) circuits
[AD-A171131] N87-15424

EROSION
Study of particulated flows and erosion in turbomachinery
[AD-A172965] N87-15232

ERROR ANALYSIS
Land mobile satellite communications: Channel model, modulation, and error control N87-15370
Errors and uncertainties in satellite derived albedo — Meteosat N87-15643
Uncertainty of satellite derived clear sky shortwave radiation budget N87-15644
Some asymptotic properties of multivariable models identified by equation error techniques
[EUT-85-E-153] N87-15751

ERROR CORRECTING DEVICES
Land mobile satellite communications: Channel model, modulation, and error control N87-15370

ERRORS
Problems in establishing and updating a digital cartographic data base at the millionth scale N87-15513

ERS-1 (ESA SATELLITE)
The prospects for hydrological measurements using ERS-1 — lakes N87-15588

ESTIMATING
Table look-up estimation of signal and noise parameters from quantized observables N87-15341
A new algorithm for microwave delay estimation from water vapor radiometer data N87-15345
Estimation of vegetation cover at subpixel resolution using LANDSAT data
[NASA-CR-177077] N87-15514

ETHANE
The determination of the global average OH concentration using a deuteroethane tracer N87-15539

EULER EQUATIONS OF MOTION
Efficient solutions to the Euler equations for supersonic flow with embedded subsonic regions
[NASA-TP-2523] N87-15183
Development of upwind schemes for the Euler equations
[NASA-CR-4043] N87-15188

EUROPE
Land mobile communications satellite missions in Europe N87-15362
Land mobile communications satellite N87-15363
Economic and market aspects of land mobile satellite compared to terrestrial cellular radio N87-15365
On-board processing payload technology for an European land mobile satellite system N87-15376
Frequency allocation in the land mobile satellite service N87-15383
Activities of the European Conference of Posts and Telecommunications (CEPT) special Group on Mobile Communications (GSM) N87-15385
The creation of an environmental information system for the European Community N87-15510
Satellite-derived vegetation index over Europe N87-15583

EUROPEAN SPACE AGENCY
Giotto navigation support N87-15354
Pathfinder operations N87-15355
VEGA Pathfinder navigation for Giotto Halley encounter N87-15358

EUROPEAN SPACE PROGRAMS
Colloquium about Joint Projects within the DFVLR/ISRO Cooperation
[DFVLR-MITT-86-16] N87-15240
Status of ISRO/DFVLR cooperation N87-15241
Possible areas of collaboration between DFVLR and ISRO in the fields of structures and materials N87-15252
A land mobile satellite for digital communications in Europe N87-15388
Future European plans in the framework of the International Satellite Land Surface Climatology Project (ISLSCP) N87-15628

EVACUATING (TRANSPORTATION)
Task force on emergency evacuation of transport airplanes. Volume 2: Supporting documentation
[AD-A172256] N87-15194

EVALUATION
Air traffic control radar beacon system transponder performance study and analysis. Vol. 1: Transponder test methodology results, analysis and recommendations
[DOT/FAA/FS-86/1.1-VOL-1] N87-15198
Evaluation of seals for high-performance cryogenic turbomachines
[NASA-TM-88919] N87-15442

EVAPORATION
Evolving ideas on the boundary layer concerning regional evaporation N87-15550

EVAPOTRANSPIRATION
Modelisation of evapotranspiration and soil available water over an agricultural region applicable for remote sensing N87-15554
Contribution of passive microwave remote sensing in soil moisture and evapotranspiration measurements N87-15589
Estimation of regional evaporation using midday surface temperature from satellite thermal IR data N87-15591
Regional measurements of evapotranspiration using aircraft mounted sensors N87-15598
Importance of the tropical rain forest as an atmospheric moisture source N87-15608
Group Agromet Monitoring Project (GAMP) methodology integrated mapping of rainfall, evapotranspiration, germination, biomass development and thermal inertia, based on Meteosat and conventional meteorological data N87-15626

EVOLUTION (DEVELOPMENT)
Mountain building processes in the Central Andes
[NASA-CR-180069] N87-15661

EXCIMERS
Photochemical ignition studies. Part 2: Oxygen-atom 2-photon resonance effects
[AD-A172974] N87-15463

EXCITATION
Investigations of the interactions of radiation with matter
[AD-A171232] N87-15779

EXHAUST EMISSION
Automotive Spark-Ignition Engine in a New European Context. Proceedings
[DE86-753253] N87-15468
Control of H2S emissions using an ozone oxidation process: Preliminary results
[NASA-TM-88475] N87-15525

EXHAUST GASES
Shuttle contamination modeling: Evolution of ionized shuttle exhaust, environmental research papers
[AD-A172278] N87-15257

EXOBIOLOGY
USSR Space Life Sciences Digest, issue 9
[NASA-CR-3922(10)] N87-15679

EXPANSION
Effect of cold-working by hole expansion on fatigue life of 7075-T7351 and 7475-T761 aluminum lugs with and without initial flaws under maneuver loading spectrum
[TAE-561] N87-15291

EXPERIMENT DESIGN
Quality assurance methods manual for experimental design and data management
[DE86-015180] N87-15473
The first International Satellite Land Surface Climatology Project (ISLSCP) Field Experiment - FIFE N87-15629
Hydrological Atmospheric Pilot Experiment (HAPEX) hydrology budget modeling (MOBILHY): Outline of the program N87-15632

EXPERT SYSTEMS
An investigation of expert systems usage for software requirements development in the strategic defense initiative environment
[AD-A169659] N87-15724

EXPLOSIONS
Explosive coalescence of current loops and particle acceleration N87-15804

EXTRAGALACTIC RADIO SOURCES
The angular sizes of faint radio sources and their implications for cosmology N87-15830

EYE (ANATOMY)
The effect of long term monocular occlusion on vernier threshold: Elasticity in the young adult visual system
[AD-A171289] N87-15688

F

F REGION
Investigation on the intensity progression of F-region nightglow emission of the oxygen red line by means of atmospheric gravity waves soliton N87-15816

FABRICATION
Rugged, thin GaAs solar cell development, phase 1
[AD-A171188] N87-15520

FADING
Signal-to-noise ratio requirements for detection of multiple pulses subject to partially correlated fading with chi-squared statistics of various degrees of freedom
[AD-A172223] N87-15405
FAILURE
Application of Barlow-Wu systems to safety monitoring systems N87-15757
FAILURE ANALYSIS
Studies and analyses of the Space Shuttle Main Engine: SSME failure data review, diagnostic survey and SSME diagnostic evaluation
[NASA-CR-178993] N87-15268
Comparison of flexural properties of aramid-reinforced pultrusions having varied matrices, pretreatments and postcures
[NASA-TM-88997] N87-15277
Failure analysis of composite structure materials
[AD-A172236] N87-15279
Program to analyze the failure mode of lead-acid batteries
[NUREG-CR-4833] N87-15415
On cavitation and residual creep life N87-15758
FAILURE MODES
Studies and analyses of the Space Shuttle Main Engine: SSME failure data review, diagnostic survey and SSME diagnostic evaluation
[NASA-CR-178993] N87-15268
Program to analyze the failure mode of lead-acid batteries
[NUREG-CR-4833] N87-15415
FAR INFRARED RADIATION
Josephson effect detectors of microwave and far infrared radiation
[AD-A171539] N87-15689
FARADAY EFFECT
Magnetic fields of hot stars: Observation methods and results N87-15800
FARMLANDS
Calibration of normalized vegetation index against pasture growth — NOAA-7 data N87-15585
FAST FOURIER TRANSFORMATIONS
Feasibility and comparison investigation of the use of the Fast Fourier Transform and finite difference method for numerical solution of boundary value problems
[AD-A172719] N87-15749
FATIGUE (MATERIALS)
Small, self-contained aircraft fatigue data recorder
[AD-A172400] N87-15207
Corrosion and stress corrosion of steel pressure boundary components and steam turbines
[DE86-780555] N87-15293
Corrosion fatigue and electrochemical reactions in modified HY130 steel
[AD-A172242] N87-15296
Creep fatigue life prediction for engine hot section materials (ISOTROPIC)
[NASA-CR-179550] N87-15491
Effects of stress on the ultrasonic response of fatigue cracks
[AERE-R-10854] N87-15497
FATIGUE LIFE
Small, self-contained aircraft fatigue data recorder
[AD-A172400] N87-15207
Effect of cold-working by hole expansion on fatigue life of 7075-T7351 and 7475-T761 aluminum lugs with and without initial flaws under maneuver loading spectrum
[TAE-561] N87-15291
High temperature monotonic and cyclic deformation in a directionally solidified nickel-base superalloy
[NASA-CR-175101] N87-15303
Lubricant effects on bearing life
[NASA-TM-88875] N87-15467
Residual life. Information Day of the Dutch Institute of Welding Techniques
[ETN-87-98730] N87-15479
Introduction to the Dutch Welding Institute project (residual) life N87-15480
Experimental program — residual life N87-15482
Short term creep tests N87-15487
Evaluation of the Dutch Welding Institute (residual) life project N87-15489
Durability of structural adhesively bonded systems
[AD-A170708] N87-15492
FAULT TOLERANCE
User's guide to programming fault injection and data acquisition in the SIFT environment
[NASA-TM-87638] N87-15722
A decentralized naming facility
[AD-A170937] N87-15725
FEATHERING
Application of higher harmonic blade feathering on the OH-6A helicopter for vibration reduction
[NASA-CR-4031] N87-15175
FEDERAL BUDGETS
NASA authorizations, fiscal year 1987
[GPO-81-975] N87-15904
Department of Housing and Urban Development, and certain independent agencies appropriations for fiscal year 1987, part 2
[S-HRG-99-707-PT-2] N87-15906
National Aeronautics and Space Administration N87-15907
National Aeronautics and Space Administration N87-15908
FEEDBACK
Self-induced frequency scanning and distributed bragg reflection in semiconductor lasers with phase-conjugate feedback
[AD-A172933] N87-15461
FEEDBACK CONTROL
Optimization of closed loop eigenvalues: Maneuvering, vibration control and structure/control design iteration for flexible spacecraft
[AD-A172716] N87-15263
Adaptive control of robotic manipulators N87-15700
FEMALES
Bedrest in healthy women: Effects of menstrual function and oral contraceptives
[NASA-CR-171946] N87-15681
FERRITES
Millimeter wave microstrip circulator utilizing hexagonal ferrites
[AD-D012445] N87-15422
FERRITIC STAINLESS STEELS
Detecting and monitoring crack growth in austenitic and ferritic steels
[DE86-014348] N87-15299
FERROELECTRICITY
Ferroic shape memory materials and Piezo:Pyro-Electric oriented recrystallized glasses
[AD-A17[illegible]409] N87-15309
FIBER OPTICS
Reference frequency transmission over optical fiber N87-15330
Printed circuit card hybrid
[AD-D012448] N87-15428
Nonlinear optical apparatus using optical fibers
[AD-D012439] N87-15787
Integrated optic modules for multichannel deflection/switching and signal processing
[AD-A171178] N87-15789
The influence of a high index microlens in a laser-taper coupling
[EUT-85-E-155] N87-15792
FIBER REINFORCED COMPOSITES
Comparison of flexural properties of aramid-reinforced pultrusions having varied matrices, pretreatments and postcures
[NASA-TM-88997] N87-15277
Theoretical and experimental analysis of multidirectionally-braided composites
[AD-A172694] N87-15281
FIBERS
Theoretical and experimental analysis of multidirectionally-braided composites
[AD-A172694] N87-15281
Mechanical properties versus morphology of ordered polymers, volume 6
[AD-A171221] N87-15307
FIELD EFFECT TRANSISTORS
Characterization of infrared properties of layer semiconductors
[AD-A172692] N87-15893
FIELD THEORY (PHYSICS)
Nonlinear partial differential equations and related problems of pade approximations
[AD-A172253] N87-15748
Scalar fields in Kasner-type space-times: Time dependent vacuum expectation values
[DE86-702622] N87-15896
FIGHTER AIRCRAFT
Subsonic maneuver capability of a supersonic cruise fighter wing concept
[NASA-TP-2642] N87-15184
FILE MAINTENANCE (COMPUTERS)
GENESIS finite element mesh file format
[DE86-012740] N87-15735
FILM COOLING
Convective Heat Transfer and Film Cooling in TurboMachinery — conference
[VKI-LS-1986-06] N87-15208
Simulation codes for calculation of heat transfer to film-cooled turbine blades N87-15216
Experimental and theoretical approaches used at the National Aerospace Laboratory in Japan — turbine blade film cooling N87-15217
Hydrodynamics of film cooling — gas turbine blades N87-15219
The scaling of film cooling: Theoretical and experimental results — gas turbines N87-15222
FILTERS
A comparison of methods for DPLL loop filter design N87-15342
FILTRATION
Infusion extractor
[NASA-CASE-MSC-20761-1] N87-15465
FINGERS
Control and simulation of a 3-jointed finger
[DE86-014303] N87-15469
End-point control of flexible manipulators
[AD-A172287] N87-15471
FINITE DIFFERENCE THEORY
An efficient algorithm for solution of the unsteady transonic small-disturbance equation
[NASA-TM-89014] N87-15176
Simulation codes for calculation of heat transfer to convectively-cooled turbine blades N87-15213
Computational fluid dynamic studies of certain ducted bluff-body flowfields relevant to turbojet combustors. Volume 2: Time-averaged flowfield predictions for a proposed centerbody combustor
[AD-A171169] N87-15447
Initial-boundary value problems for linear hyperbolic systems
[AD-A171527] N87-15747
Feasibility and comparison investigation of the use of the Fast Fourier Transform and finite difference method for numerical solution of boundary value problems
[AD-A172719] N87-15749
FINITE ELEMENT METHOD
Finite element analysis of propagating interface cracks in composites N87-15276
FEM model of 3D transient temperature and stress fields in welded plates N87-15478
Simple formulas for strain-energy release rates with higher order and singular finite elements
[NASA-CR-178186] N87-15490
Durability of structural adhesively bonded systems
[AD-A170708] N87-15492
GENESIS finite element mesh file format
[DE86-012740] N87-15735
FINNED BODIES
Numerical solution of laminar and turbulent boundary layer equations including transition and experimental study of a flat plate with a blunt fin at incidence
[AD-A172409] N87-15450
FIRE DAMAGE
The use of remote sensing techniques in the study of vegetation recovery after fire in mediterranean countries (a preliminary study) N87-15623
FISSION
Calculations of heat deposition in a target system bombarded by high energy charged particles
[DE86-700263] N87-15784
FLAME PROPAGATION
Pressure interactions in supersonic combustion
[AD-A172711] N87-15289
FLANGES
LaRC conceptual design of solid rocket booster in-line bolted joint
[NASA-TM-89046] N87-15177
FLAPS (CONTROL SURFACES)
Applicability of linearized-theory attached-flow methods to design and analysis of flap systems at low speeds for thin swept wings with sharp leading edges
[NASA-TP-2653] N87-15174
FLASH POINT
Critical flows — liquids N87-15325
FLASHOVER
Research on factors that affect the reliability of compressed gas insulated apparatus
[DE86-014417] N87-15437
FLAT PLATES
Depolarization and scattering of electromagnetic waves
[AD-A171217] N87-15401
FLEXIBILITY
End-point control of flexible manipulators
[AD-A172287] N87-15471
FLEXIBLE BODIES
Optimization of closed loop eigenvalues: Maneuvering, vibration control and structure/control design iteration for flexible spacecraft
[AD-A172716] N87-15263
FLEXING
Comparison of flexural properties of aramid-reinforced pultrusions having varied matrices, pretreatments and postcures
[NASA-TM-88997] N87-15277
FLIGHT CHARACTERISTICS
Flared landing approach flying qualities. Volume 1: Experiment design and analysis
[NASA-CR-178188-VOL-1] N87-15234

FLIGHT CONTROL
Handbook. Volume 1: Validation of digital systems in avionics and flight control applications
[DOT/FAA/CT-82/115-VOL-1-REV] N87-15204
FLIGHT RECORDERS
Small, self-contained aircraft fatigue data recorder
[AD-A172400] N87-15207
FLIGHT TESTS
A flight demonstration program on space data handling N87-15246
Variations in in-flight absolute radiometric calibration — satellite remote sensors N87-15594
Test processing system (SEE)
[NASA-TM-88514] N87-15704
FLOW CHARACTERISTICS
Thermodynamic and Flow Mechanical Problems in Aircraft and Spacecraft Drives. Summary of conference reports for 1974, 1975, 1976
[ETN-87-98750] N87-15223
Single-substance, two-phase duct flow: A unified theoretical and experimental study N87-15438
FLOW DISTRIBUTION
Transonic controversy and regular perturbation methods for subcritical flows N87-15172
Drag predictions for projectiles at transonic and supersonic speeds
[AD-A171462] N87-15191
Problems of the compensation calculation for the interferometry of spatial flows N87-15228
Numerical simulations of the flowfield in a central-dump ramjet combustor. Part 1: Test of the model and effects of forcing
[AD-A170936] N87-15229
Procedure for computing transonic flows for control of adaptive wind tunnels
[NASA-TM-88530] N87-15235
Development of instrumentation to measure sound speed and flow direction in dusty flow fields
[AD-A171050] N87-15453
FLOW EQUATIONS
A simple concept for the computation of steady supersonic flow with supply of heat N87-15224
Vortex and spiral structures in sheared flows — shallow water plasma analogy N87-15866
FLOW MEASUREMENT
Viscous analyses for flow through subsonic and supersonic intakes
[NASA-TM-88831] N87-15173
The effect of wake passing on turbine blades N87-15221
FLOW STABILITY
Vortex and spiral structures in sheared flows — shallow water plasma analogy N87-15866
FLOW THEORY
Shear localization in rate and temperature dependent solids N87-15477
FLOW VELOCITY
Effects of the oceans on polar motion: Extended investigations
[NASA-CR-180066] N87-15677
FLOW VISUALIZATION
Numerical solution of laminar and turbulent boundary layer equations including transition and experimental study of a flat plate with a blunt fin at incidence
[AD-A172409] N87-15450
FLUID FLOW
Study of particulated flows and erosion in turbomachinery
[AD-A172965] N87-15232
FLUORESCENCE
Fluorometric method for the determination of gas-phase hydrogen peroxide N87-15541
Tropospheric HO2 determination by FAGE N87-15542
COCHISE atmospheric nitrogen/oxygen excitation studies
[AD-A172234] N87-15667
FLYBY MISSIONS
ICE Second Halley radial: TDA mission support and DSN operations N87-15358
FOCUSING
Effects of strong diffraction on the focusing and scattering of acoustic waves
[AD-A171220] N87-15776
Experimental evaluation of the ring focus test for X-ray telescopes using AXAF's technology mirror assembly, MSFC CDDF Project No. H20
[NASA-TM-86570] N87-15916
FORESTS
Investigation of the UHF mobile-radio propagation channel in a temperate-zone forested environment
[AD-A171431] N87-15403
Quality assurance methods manual for experimental design and data management
[DE86-015180] N87-15473
Canopy reflectance modeling in a tropical wooded grassland
[NASA-CR-180097] N87-15518
AVHRR and MSS data based vegetation indices studies over Indian sites — NOAA radiometer (AVHRR) LANDSAT multispectral scanner (MSS) N87-15622
FORMALISM
Proposal for a language definition formalism and selection of test cases. Deliverable D4 of task T4 - second review — programming language N87-15716
User definable syntax for specification languages. Annexe D4.A1 of deliverable D4 — programming languages N87-15717
Proposal for an algebraic semantics definition formalism. Annexe D4.A3 of deliverable D4 - second review — programming languages
[CWI-CS-R8504] N87-15719
FRACTOGRAPHY
Failure analysis of composite structure materials
[AD-A172236] N87-15279
FRACTURE MECHANICS
Corrosion fatigue and electrochemical reactions in modified HY130 steel
[AD-A172242] N87-15296
Electrochemical reactions with bare metal surfaces and corrosion fatigue crack growth
[AD-A172248] N87-15297
Fracture mechanics and creep crack growth in steel of the type 1%Cr0.5Mo, with or without preceeding exposure under creep crack circumstances N87-15488
Mechanics of shear rupture applied to earthquake zones
[NASA-CR-180070] N87-15663
FRACTURE STRENGTH
Fatigue crack propagation and fracture toughness of plasma arc welded Ti-6Al-4V alloy
[RAE-TR-85066] N87-15478
FRAGMENTATION
Vacuum ultraviolet photochemistry
[DE86-015768] N87-15282
FRAUNHOFER LINE DISCRIMINATORS
Fraunhofer filters to reduce solar background for optical communications N87-15335
FREE ELECTRON LASERS
Radiation produced by the modulated electron beam of a free electron laser
[AD-A171168] N87-15457
Theoretical studies in free-electron lasers
[AD-A171174] N87-15458
FREE ELECTRONS
The application of laser saturation to the efficient generation of short wavelength radiation from plasmas
[AD-A172945] N87-15462
FRENCH SPACE PROGRAMS
Selection of radio sources for Venus balloon-Pathfinder Delta-DOR navigation at 1.7 GHz N87-15357
FREQUENCY ASSIGNMENT
Proceedings of an ESA Workshop on Land Mobile Services by Satellite
[ESA-SP-259] N87-15361
Land mobile satellite service: Regulatory aspects — frequency assignment N87-15379
Frequency spectrum allocation for a potential land mobile-satellite service N87-15380
Spectrum requirements for the land mobile satellite service, INMARSAT N87-15382
Frequency allocation in the land mobile satellite service N87-15383
Investigation of magnetostatic surface waves for anisotropic effects
[AD-A172375] N87-15774
FREQUENCY MODULATION
Modulation and voice coding for mobile satellite applications N87-15378
Ultrasensitive detection of atmospheric trace gases using frequency modulation spectroscopy N87-15535
FREQUENCY SCANNING
Self-induced frequency scanning and distributed bragg reflection in semiconductor lasers with phase-conjugate feedback
[AD-A172933] N87-15461
FREQUENCY STABILITY
Reference frequency transmission over optical fiber N87-15330
FREQUENCY STANDARDS
Reference frequency transmission over optical fiber N87-15330
FUEL COMBUSTION
An experimental investigation of combustion modulation techniques for a solid fuel ramjet
[AD-A172322] N87-15230
FUEL CONTROL
An evaluation of descent strategies for TNAV-equipped aircraft in an advanced metering environment
[NASA-CR-178093] N87-15197
FUEL INJECTION
Pressure interactions in supersonic combustion
[AD-A172711] N87-15289
FUEL PRODUCTION
High-temperature composite thermal energy storage for solar applications
[DE86-014161] N87-15522
FUNCTIONAL DESIGN SPECIFICATIONS
The dynamic scaling and development of model helicopter rotor blades for the RAE 24ft wind tunnel test rig
[RAE-TR-85052] N87-15203
Establishment of a common environment. Deliverable D1 of task T1 - second review — computer programming N87-15709
Proposal for a language definition formalism and selection of test cases. Deliverable D4 of task T4 - second review — programming language N87-15716
FUNCTIONS (MATHEMATICS)
The five deepest potential hypersurfaces of the CH2(+) ion. Description by continuous functions adapted to initial values
[MPIS-4/1986] N87-15781
FUSION REACTORS
Tensile behavior of helium-implanted and neutron-irradiated V-15Cr-5Ti
[DE86-007301] N87-15292

G

GALACTIC CLUSTERS
Structure of the Coma cluster of galaxies N87-15917
GALACTIC EVOLUTION
Coemions and galaxy formation N87-15799
GALACTIC NUCLEI
Relativistic plasmas in active galactic nuclei N87-15794
Blazars: Beamed or not beamed — quasars, BL Lac objects N87-15801
Radiative acceleration of clouds near compact accreting objects — active galactic nuclei N87-15843
EX56a study of extended X-ray emission around isolated galaxies EX56b identification and spectra of bright X-ray sources at high galactic latitude
[NASA-CR-180099] N87-15931
GALACTIC RADIATION
An assessment of transport coefficient approximations used in galactic heavy ion shielding calculations
[NASA-TM-89054] N87-15782
Infrared and CCD photometric study of spiral galaxies N87-15913
GALACTIC STRUCTURE
The wrap up problem of the galactic magnetic field N87-15870
Structure of the Coma cluster of galaxies N87-15917
GALLIUM ARSENIDES
Rugged, thin GaAs solar cell development, phase 1
[AD-A171188] N87-15520
GALLIUM PHOSPHIDES
Current- and lattice-matched tandem solar cell
[DE86-013757] N87-15521
GAMMA RAY ASTRONOMY
Ion acceleration in solar flares enriched by helium-3 and in gamma-ray line flares N87-15808
GAMMA RAY BURSTS
Quantum effects in synchronization radiation of a plasma in superstrong magnetic fields of neutron stars N87-15846
GAMMA RAYS
Effect of light-soaking on electronic properties of glow-discharged hydrogenated amorphous silicon N87-15763
Gamma-positronium in the magnetosphere of a pulsar N87-15852
GAS ANALYSIS
Fluorometric method for the determination of gas-phase hydrogen peroxide N87-15541
GAS BEARINGS
Non-reference analysis of rotational accuracy with nanometer resolution on ultraprecision spindle N87-15770
GAS COMPOSITION
Ultrasensitive detection of atmospheric trace gases using frequency modulation spectroscopy N87-15535
GAS COOLING
Garrett TFE-731 hp turbine stage without and with cooling-gas injection N87-15210
GAS DETECTORS
Development of N(2) sensor for determination of PN(2) in body tissues
[AD-A171330] N87-15690
GAS DYNAMICS
Conservative boundary conditions for 3D gas dynamics problems
[NASA-TM-88487] N87-15444

GAS EXPANSION
Tropospheric HO determination by FAGE N87-15532
Tropospheric HO2 determination by FAGE N87-15542

GAS FLOW
Development of instrumentation to measure sound speed and flow direction in dusty flow fields [AD-A171050] N87-15453
Gas rotation above the galactic disk N87-15873

GAS INJECTION
Garrett TFE-731 hp turbine stage without and with cooling-gas injection N87-15210
A fluid simulation of the AMPTE neutral gas release in the solar wind N87-15819

GAS IONIZATION
The critical ionization velocity phenomenon in astrophysics N87-15814
Intense and short pulse electric field (dc and microwave) air breakdown parameters [AD-A172227] N87-15878

GAS TURBINE ENGINES
Experimental short-duration techniques — gas turbine engine tests N87-15209
Garrett TFE-731 hp turbine stage without and with cooling-gas injection N87-15210
Low aspect ratio turbine stage without cooling-gas injection N87-15211
The National Gas Turbine projects in Japan. The FJR-710 turbofan engine project. The ADTJ-100 high efficient gas turbine project N87-15218
Unsteady aerodynamic and heat transfer processes in a transonic turbine stage N87-15220
Carbon residue studies with a micro carbon residue tester [AD-A171153] N87-15306

GAS TURBINES
Creep fatigue life prediction for engine hot section materials (ISOTROPIC) [NASA-CR-179550] N87-15491

GAS-SOLID INTERFACES
Laser-linewidth effects on the photon-phonon conversion rate at a gas-solid interfaces [AD-A171489] N87-15886

GASEOUS DIFFUSION
Aging of polyurethane foams, the influence of gas diffusion on thermal conductivity [DE86-014339] N87-15314

GASEOUS FUELS
An experimental investigation of combustion modulation techniques for a solid fuel ramjet [AD-A172322] N87-15230

GASEOUS ROCKET PROPELLANTS
Photochemical ignition studies. Part 2: Oxygen-atom 2-photon resonance effects [AD-A172974] N87-15463

GASES
Mathematical modeling and experimental investigation of heavier-than-air gas dispersion in the atmosphere N87-15526

GATES (CIRCUITS)
Amplification of electrical signals with molecule-based transistors: Power amplification up to a kilohertz frequency and factors limiting higher frequency operation [AD-A172700] N87-15434
Optical processing [AD-A172362] N87-15791

GAUGE THEORY
Effective Einsteinian gravity from Poincare gauge field theory [DE86-702874] N87-15897

GEAR TEETH
New generation methods for spur, helical, and spiral-bevel gears [NASA-TM-88862] N87-15466

GEARS
New generation methods for spur, helical, and spiral-bevel gears [NASA-TM-88862] N87-15466

GENERAL AVIATION AIRCRAFT
Aircraft accident reports: Brief format, US civil and foreign aviation, issue number 7 of 1985 accidents [PB86-916921] N87-15195
Aircraft accident reports: Brief format, US civil and foreign aviation, issue number 6 of 1985 accidents [PB86-916920] N87-15196

GEODYNAMICS
The Telecommunications and Data Acquisition Report [NASA-CR-179938] N87-15329

GEOIDS
Undersea volcano production versus lithospheric strength from satellite altimetry [NASA-CR-179984] N87-15660

GEOLOGICAL FAULTS
Crustal deformation in great California earthquake cycles [NASA-CR-180059] N87-15655
Mechanics of shear rupture applied to earthquake zones [NASA-CR-180070] N87-15663
Unstable deformation in layered media: Application to planetary lithospheres N87-15925

GEOLOGICAL SURVEYS
Geological-morphological description of the Lakshmi planum (photomap of the Venusian surface sheet B-4) [NASA-TM-88495] N87-15926

GEOMAGNETIC TAIL
Magnetospheric tails in the solar planetary system N87-15818
Stochastization of charged particle motion near a magnetic field reversal and the problem of explosive reconnection — magnetotail N87-15823
Spontaneous reconnection in the Earth's magnetotail N87-15825

GEOMAGNETISM
Spontaneous reconnection at the boundaries of planetary magnetospheres N87-15815
The problem of the MHD flow near stagnation point of the current sheet — geomagnetism-solar wind N87-15817

GEOMETRIC RECTIFICATION (IMAGERY)
Automatic geometric correction after scanning — road mapping N87-15508

GERMANIUM
Laser-induced chemical vapor deposition of germanium and doped-germanium films [AD-D012462] N87-15888

GERMANIUM COMPOUNDS
Preparation and characterization of several 2-4-V2 stannite single crystals [AD-A172238] N87-15890

GERMINATION
Group Agromet Monitoring Project (GAMP) methodology integrated mapping of rainfall, evapotranspiration, germination, biomass development and thermal inertia, based on Meteosat and conventional meteorological data N87-15626

GIOTTO MISSION
Giotto mission support N87-15353
Giotto navigation support N87-15354
Pathfinder operations N87-15355
VEGA Pathfinder navigation for Giotto Halley encounter N87-15356

GLACIERS
Parameterization of glacierization for a climate model N87-15560

GLASS
Chalcogenide glasses. Part 4: Crystallization and glass transition characteristics in AS(2-x)Sb(x)S(3) glass-forming system [AD-A171564] N87-15310
Structural-mechanics behavior of insulating glass units [PB86-234614] N87-15316

GLIDE PATHS
An evaluation of descent strategies for TNAV-equipped aircraft in an advanced metering environment [NASA-CR-178093] N87-15197

GLOBAL POSITIONING SYSTEM
Thermal vacuum heater array apparatus [AD-D012436] N87-15420

GLOBULAR CLUSTERS
Main sequence photometry of globular clusters N87-15920

GLOW DISCHARGES
Effect of light-soaking on electronic properties of glow-discharged hydrogenated amorphous silicon N87-15763

GOVERNMENT PROCUREMENT
Air traffic control: FAA's (Federal Aviation Administration's) advanced automation system acquisition strategy is risky [PB86-231743] N87-15200

GOVERNMENT/INDUSTRY RELATIONS
H.R. 4932: To amend land remote sensing commercialization [GPO-64-491] N87-15515

GRAIN BOUNDARIES
Observations of hierarchal grain boundary dislocation structures in 001 symmetric tilt boundaries in gold [DE86-015729] N87-15301
Report of a discussion meeting on the structure of internal interfaces [DE86-015730] N87-15302
High temperature monotonic and cyclic deformation in a directionally solidified nickel-base superalloy [NASA-CR-175101] N87-15303

GRANTS
Computer facilities for high-speed data acquisition, signal processing and large scale system simulation [AD-A170935] N87-15737

GRAPHITE-EPOXY COMPOSITES
The effects of implanted delaminations on the tensile strength of graphite/epoxy laminates [AD-A171329] N87-15278
Interleaved arrays antenna technology development [NASA-CR-171951] N87-15393

GRASSLANDS
Canopy reflectance modeling in a tropical wooded grassland [NASA-CR-180097] N87-15518
Calibration of normalized vegetation index against pasture growth — NOAA-7 data N87-15585

GRAVITATION
Spontaneous compactification of extra dimensions in eleven-dimensional quantum gravity [DE86-702620] N87-15895

GRAVITATION THEORY
Effective Einsteinian gravity from Poincare gauge field theory [DE86-702874] N87-15897

GRAVITATIONAL FIELDS
Equilibrium and stability of galaxies in binary systems N87-15796

GRAVITY WAVES
Investigation on the intensity progression of F-region nightglow emission of the oxygen red line by means of atmospheric gravity waves soliton N87-15816

GREECE
The use of remote sensing techniques in the study of vegetation recovery after fire in mediterranean countries (a preliminary study) N87-15623

GREEN'S FUNCTIONS
Mechanics of shear rupture applied to earthquake zones [NASA-CR-180070] N87-15663
Vector image method for the derivation of elastostatic solutions for point sources in a plane layered medium. Part 1: Derivation and simple examples [NASA-CR-180062] N87-15743
Image method for the derivation of point sources in elastostatic problems with plane interfaces [NASA-CR-180060] N87-15744

GREENLAND
Variation in surface albedo and energy-balance in an arctic/subarctic environment N87-15616

GROUND EFFECT (COMMUNICATIONS)
Ground plane interference elimination by passive element [NASA-CASE-NPO-18632-1-CU] N87-15390

GROUND STATIONS
Design considerations for the beam-waveguide retrofit of a ground antenna station N87-15331
A cost-performance model for ground-based optical communications receiving telescopes N87-15336

GROUND TRUTH
Ground based atmospheric extinction measurement in the Sahel — satellite monitoring N87-15597

GUY WIRES
Induced insulator voltage in transmitter antenna guy cables [AD-A169656] N87-15417

H

HALF SPACES
Vector image method for the derivation of elastostatic solutions for point sources in a plane layered medium. Part 1: Derivation and simple examples [NASA-CR-180062] N87-15743
Image method for the derivation of point sources in elastostatic problems with plane interfaces [NASA-CR-180060] N87-15744

HALLEY'S COMET
Giotto mission support N87-15353
Giotto navigation support N87-15354
VEGA Pathfinder navigation for Giotto Halley encounter N87-15356
Selection of radio sources for Venus balloon-Pathfinder Delta-DOR navigation at 1.7 GHz N87-15357
ICE Second Halley radial: TDA mission support and DSN operations N87-15358

HAMILTONIAN FUNCTIONS
MOPAC manual (version 3.10): A general molecular orbital package, IBM-PC version, 1st edition [AD-A172361] N87-15313
Kinetic equation for Hamiltonian systems integrable in the mean field approximation — globular star clusters N87-15795

HAND (ANATOMY)
Control and simulation of a 3-jointed finger [DE86-014303] N87-15469

HARDENING (MATERIALS)
An endochronic rate-sensitive constitutive equation for metals: Application to generalized creep [AD-A172705] N87-15298

HARMONIC CONTROL
Application of higher harmonic blade feathering on the OH-6A helicopter for vibration reduction
[NASA-CR-4031] N87-15175

HARMONICS
Harmonic conversion of GEKKO 12 high-power Nd:glass laser N87-15767

HAZARDS
Overview of major hazards. Part 2: Source term; dispersion; combustion; blast, missiles, venting; fire; radiation; runaway reactions; toxic substances; dust explosions N87-15323

HEAT EXCHANGERS
Low heat transfer oxidizer heat exchanger design and analysis
[NASA-CR-179488] N87-15272

HEAT FLUX
Garrett TFE-731 hp turbine stage without and with cooling-gas injection N87-15210
Low aspect ratio turbine stage without cooling-gas injection N87-15211
Time-resolved heat flux measurement for the rotor blade of a TFA-731-2 hp turbine N87-15212
Modelisation of evapotranspiration and soil available water over an agricultural region applicable for remote sensing N87-15554
Sonic anemometer surface heat flux measurements for validation of satellite observations N87-15599

HEAT MEASUREMENT
Low aspect ratio turbine stage without cooling-gas injection N87-15211
Time-resolved heat flux measurement for the rotor blade of a TFA-731-2 hp turbine N87-15212

HEAT SHIELDING
Method and apparatus for increasing service life of augmentor and combustion chamber liners
[AD-D012443] N87-15273

HEAT STORAGE
High-temperature composite thermal energy storage for solar applications
[DE86-014161] N87-15522

HEAT TRANSFER
Low heat transfer oxidizer heat exchanger design and analysis
[NASA-CR-179488] N87-15272
Application of Rayleigh scattering to turbulent flow with heat transfer and combustion
[AD-A172934] N87-15290
Simulation of two-dimensional internal incompressible separated flows with heat transfer N87-15439
The detailed mathematical prediction of simultaneous heat and mass transfer in cavities N87-15440
Calculations of heat deposition in a target system bombarded by high energy charged particles
[DE86-700263] N87-15784

HEAT TREATMENT
Metallurgical variables influencing the corrosion susceptibility of P/M (Powder Metallurgy) 7091 Aluminum/SiCw composite
[AD-A170946] N87-15294

HEATING EQUIPMENT
Automation of preparation of nonmetallic samples for analysis by atomic absorption and inductively coupled plasma spectrometry
[NASA-TM-88476] N87-15285
Thermal vacuum heater array apparatus
[AD-D012436] N87-15420

HEAVY IONS
An assessment of transport coefficient approximations used in galactic heavy ion shielding calculations
[NASA-TM-89054] N87-15782

HELICOPTERS
Application of higher harmonic blade feathering on the OH-6A helicopter for vibration reduction
[NASA-CR-4031] N87-15175
A comparison of the acoustic and aerodynamic measurements of a model rotor tested in two anechoic wind tunnels
[NASA-TM-88364] N87-15178
New generation methods for spur, helical, and spiral-bevel gears
[NASA-TM-88862] N87-15466

HELIOSEISMOLOGY
Helioseismology and the internal structure of the Sun N87-15807

HELIOSPHERE
The two state structure of the solar wind and its influence upon proton temperatures in the inner heliosphere. Observations of Helios 1 and Helios 2 N87-15929

HELIUM
Ion acceleration in solar flares enriched by helium-3 and in gamma-ray line flares N87-15808

HETEROGENEITY
Chalcogenide glasses. Part 4: Crystallization and glass transition characteristics in AS(2-x)Sb(x)S(3) glass-forming system
[AD-A171564] N87-15310

HETEROJUNCTIONS
Fundamental aspects of heterojunction bipolar transistor technology
[AD-A171225] N87-15426
Current- and lattice-matched tandem solar cell
[DE86-013757] N87-15521

HIERARCHIES
An analysis method of strongly connected structure based on fundamental cycles N87-15761

HIGH ACCELERATION
G-tolerance standards for aircrew training and selection
[AD-A170441] N87-15685

HIGH LEVEL LANGUAGES
A rewrite rule machine. Programming by generic example
[AD-A171074] N87-15726
Theory of non-first Norman form relational databases
[AD-A171285] N87-15729

HIGH RESOLUTION
DSN microwave antenna holography. Part 2: Data processing and display of high-resolution effective maps N87-15339

HIGH SPEED
Transition fixing in the high speed range for the development of civil aircraft wings N87-15164

HIGH STRENGTH STEELS
Corrosion fatigue and electrochemical reactions in modified HY130 steel
[AD-A172242] N87-15296

HIGH TEMPERATURE
An overview of CVD processes
[NASA-TM-88450] N87-15283
High-temperature composite thermal energy storage for solar applications
[DE86-014161] N87-15522

HIGH TEMPERATURE ENVIRONMENTS
Assessment of creep loaded high temperature installations N87-15481
Structure as a criterion for high temperature ductility N87-15485

HIGH TEMPERATURE LUBRICANTS
Carbon residue studies with a micro carbon residue tester
[AD-A171153] N87-15306

HIGH TEMPERATURE PLASMAS
Very hot interstellar matter heated by a galactic shock wave N87-15828

HISTORIES
Proceedings of the 40th Anniversary of the Joint Services Electronics Program
[AD-A171610] N87-15431

HOLE GEOMETRY (MECHANICS)
Effect of cold-working by hole expansion on fatigue life of 7075-T7351 and 7475-T761 aluminum lugs with and without initial flaws under maneuver loading spectrum
[TAE-561] N87-15291

HOLOGRAPHY
DSN microwave antenna holography. Part 2: Data processing and display of high-resolution effective maps N87-15339
Optical processing
[AD-A172362] N87-15791

HOOP COLUMN ANTENNAS
Technology for large space systems: A bibliography with indexes (supplement 15)
[NASA-SP-7046(15)] N87-15239

HORIZONTAL FLIGHT
Dynamic stability of hingeless and bearingless rotor blades in forward flight N87-15201

HOT STARS
Magnetic fields of hot stars: Observation methods and results N87-15800

HUMAN BEINGS
Seat experiment results of full-scale transport aircraft controlled impact demonstration
[AD-A172245] N87-15193
Human real time perception in noise
[AD-A172374] N87-15699

HUMAN FACTORS ENGINEERING
On the pilot's behavior of detecting a system parameter change
[NASA-TM-88479] N87-15695
Survey of ergonomics databases in member countries of the international ergonomics association
[AD-A171142] N87-15701
Use of disjunctive response requirements in dual-task environments: implications for automation
[AD-A171277] N87-15702

HUMAN PERFORMANCE
Use of disjunctive response requirements in dual-task environments: Implications for automation
[AD-A171277] N87-15702

HUMAN REACTIONS
Use of disjunctive response requirements in dual-task environments: Implications for automation
[AD-A171277] N87-15702

HUMIDITY
Tethered balloon measurements at San Nicolas Island (October 1984): Instrumentation, data summary, preliminary data interpretation
[AD-A172226] N87-15674

HYBRID PROPULSION
Integrated turboramjet-rocket performance potential: Project ITUSTRA — hybrid propulsion systems
[ICAS-DGLR-76-045] N87-15227

HYDRAZINES
Study of the kinetics of catalytic decomposition of hydrazine vapors on palladium
[NASA-TM-88549] N87-15286

HYDROCARBONS
The five deepest potential hypersurfaces of the CH2(+) ion. Description by continuous functions adapted to initial values
[MPIS-4/1986] N87-15781

HYDRODYNAMICS
Hydrodynamics of film cooling — gas turbine blades N87-15210

HYDROGEN
Inelastic gas-surface scattering. Part 2: Results
[AD-A171587] N87-15780

HYDROGEN EMBRITTLEMENT
Corrosion and stress corrosion of steel pressure boundary components and steam turbines
[DE86-780555] N87-15293

HYDROGEN PEROXIDE
Future directions for H sub x O sub y detection
[NASA-CP-2448] N87-15528
Peroxy radical detection by chemical amplification (PERCA) N87-15540
Fluorometric method for the determination of gas-phase hydrogen peroxide N87-15541

HYDROGEN SULFIDE
Control of H2S emissions using an ozone oxidation process: Preliminary results
[NASA-TM-88475] N87-15525

HYDROLOGY
The sensitivity of the UK Meteorological Office atmospheric general circulation model to recent changes to the parameterization of hydrology N87-15564
Hydrological studies in Niger N87-15609

HYDROLOGY MODELS
Hydrologic models of land surface processes — soil moisture N87-15547
A boundary layer and soil moisture for use in GCMs — General Circulation Models (GCM) N87-15555
Remote sensing identified in climate model experiments with hydrological and albedo changes in the Sahel N87-15569
Hydrological atmospheric pilot experiment (HAPEX) 86 N87-15627
Hydrological Atmospheric Pilot Experiment (HAPEX) hydrology budget modeling (MOBILHY): Outline of the program N87-15632

HYDROMETEOROLOGY
Hydrological atmospheric pilot experiment (HAPEX) 86 N87-15627

HYDROXYL RADICALS
NMR (Nuclear Magnetic Resonance) investigations of liquid propellant systems consisting of alkyl- and hydroxyl-ammonium nitrates. Part 1: Characterization of Carbon-13, proton, and Nitrogen-15 NMR spectra and analytical applications
[AD-A171577] N87-15319
Future directions for H sub x O sub y detection
[NASA-CP-2448] N87-15528
Future directions for H sub x O sub y detection, executive summary N87-15529
OH radical measurements by optical absorption spectroscopy N87-15530
OH measurement by laser light absorption N87-15531
Tropospheric HO determination by FAGE N87-15532
Two-photon laser-induced fluorescence detection of OH N87-15533
OH detection by Ford Motor Company N87-15534
Remote detection of OH N87-15536
Indirect determination of OH N87-15537
Measurement of atmospheric HO by a chemical method N87-15538
The determination of the global average OH concentration using a deuteroethane tracer N87-15539
Peroxy radical detection by chemical amplification (PERCA) N87-15540

HYGROMETERS
Water vapor profiles for Washington, D.C.; Boulder, Colorado; Palestine, Texas; Laramie, Wyoming and Fairbanks, Alaska during the period 1974 to 1985: Data report
[PB86-234622] N87-15675
HYPERBOLIC DIFFERENTIAL EQUATIONS
Initial-boundary value problems for linear hyperbolic systems
[AD-A171527] N87-15747
HYPERSONIC FLOW
Two- and three-dimensional viscous computations of a hypersonic inlet flow
[NASA-TM-88923] N87-15441
HYPERSONIC GLIDERS
Maximum-terminal-velocity guidance for a hypersonic glider N87-15202
HYPERSONIC NOZZLES
Thermal analysis and design of a cooling system for a Mach 14 nozzle
[NASA-CR-180098] N87-15271

I

ICE FORMATION
Parameterization of glacierization for a climate model N87-15560
IDENTIFYING
Identification of damping parameters of a squeeze-film bearing
[AD-A169678] N87-15470
Vegetation identification and variability in the Tahoua area, Nigeria — LANDSAT thematic mapper N87-15610
IGNITION
Photochemical ignition studies. Part 2: Oxygen-atom 2-photon resonance effects
[AD-A172974] N87-15463
IMAGE ANALYSIS
Estimation of global, direct and diffuse radiation from satellite images by statistical methods N87-15639
Errors and uncertainties in satellite derived albedo — Meteosat N87-15643
IMAGE CONTRAST
Improvement of image quality of radiograph by means of narrow area radiation method N87-15760
IMAGE MOTION COMPENSATION
Stationary/slowly moving target detection in strong background clutter
[AD-A172225] N87-15406
IMAGE PROCESSING
Estimation of atmospheric turbidity — satellite imagery N87-15645
Spatial scale in image detection and recognition
[AD-A171348] N87-15691
Minimum points and views for the recovery of 3-dimensional structure
[AD-A171148] N87-15696
Improvement of image quality of radiograph by means of narrow area radiation method N87-15760
IMAGE RESOLUTION
Evaluation of the geostationary satellite images ground resolution — spatial resolution N87-15595
Temporal, spectral, and spatial samplings: Problem in radiation budget measurements — Earth radiation N87-15640
IMAGING TECHNIQUES
Seeing effects and their calibration for astronomical speckle interferometry N87-15914
IMPACT DAMAGE
Cratering mechanics
[NASA-TM-88477] N87-15662
IMPACT LOADS
Seat experiment results of full-scale transport aircraft controlled impact demonstration
[AD-A172245] N87-15193
INCOMPRESSIBLE FLOW
Simulation of two-dimensional internal incompressible separated flows with heat transfer N87-15439
INCOMPRESSIBLE FLUIDS
An 1 sup (p) theory for the n-dimensional, stationary, compressible, Navier-Stokes equations, and the incompressible limit for compressible fluids. The equilibrium solutions
[AD-A172778] N87-15451
INDEXES (DOCUMENTATION)
Subject categorization guide for defense science and technology
[AD-A172650] N87-15903
INDEXES (RATIOS)
Satellite-derived vegetation index over Europe N87-15583
INDIA
Variation of skin temperature in desert regions in the neighbourhood of India in relation to Asian monsoon circulation N87-15620
AVHRR and MSS data based vegetation indices studies over Indian sites — NOAA radiometer (AVHRR) LANDSAT multispectral scanner (MSS) N87-15622
INDIAN SPACE PROGRAM
Status of ISRO/DFVLR cooperation N87-15241
Indian remote sensing program N87-15242
SABREX: A 90 GHz radiometer experiment on a Rohini satellite — Satellite Borne Radiometer Experiment (SABREX) N87-15243
Status of launch vehicle, satellite and mission related activities for MEOSS — Mono Electro-Optical Stereo Scanner (MEOSS) N87-15244
Presentation of the status of the experiment Monocular Electro-Optical Stereo Scanner (MEOSS) N87-15245
A flight demonstration program on space data handling N87-15246
APC: A concept demonstration of end-to-end packetized data transportation techniques N87-15247
Satellite communications — India N87-15251
Possible areas of collaboration between DFVLR and ISRO in the fields of structures and materials N87-15252
INDIAN SPACECRAFT
Indian remote sensing program N87-15242
INDIUM PHOSPHIDES
Current- and lattice-matched tandem solar cell
[DE86-013757] N87-15521
INDUSTRIAL SAFETY
Two Phase Flows in Major Technological Hazards, volume 1 — conference
[VKI-LS-1986-03-VOL-1] N87-15321
Overview of major hazards research. Part 1: Of risk and all that — chemical and petrochemical industries N87-15322
Multiphase problems related to safety studies in the process industries N87-15324
INELASTIC SCATTERING
Seventh International Summer Institute in Surface Science
[AD-A171449] N87-15287
Inelastic gas-surface scattering. Part 2: Results
[AD-A171567] N87-15780
INERTIA
Identification of damping parameters of a squeeze-film bearing
[AD-A169678] N87-15470
Parameterization of albedo, thermal inertia, and surface roughness of desert scrub/sandy soil surface N87-15557
Lageos orbit decay due to infrared radiation from Earth
[NASA-TM-87804] N87-15665
INERTIAL NAVIGATION
Inertial surveying and the collection of data base information — road maps N87-15500
INFORMATION DISSEMINATION
The impact on the OCLC interlibrary loan subsystem on ARL libraries N87-15900
INFORMATION THEORY
Minimum points and views for the recovery of 3-dimensional structure
[AD-A171148] N87-15696
The role for entropy and information in software reliability
[BAE-ST-30581] N87-15706
The power of the queue
[AD-A171536] N87-15732
INFORMATION TRANSFER
Subject categorization guide for defense science and technology
[AD-A172650] N87-15903
INFRARED IMAGERY
Experimental and theoretical approaches used at the National Aerospace Laboratory in Japan — turbine blade film cooling N87-15217
Rainfall estimation over the Sahel using Meteosat thermal infra-red data N87-15587
Estimation of regional evaporation using midday surface temperature from satellite thermal IR data N87-15591
INFRARED PHOTOGRAPHY
Problems in the application of thermal images in urban climatology N87-15649
INFRARED PHOTOMETRY
Tailorable infrared sensing device with strain layer superlattice structure
[NASA-CASE-NPO-16607-1] N87-15883
Infrared and CCD photometric study of spiral galaxies N87-15913
INFRARED RADIATION
Lageos orbit decay due to infrared radiation from Earth
[NASA-TM-87804] N87-15665
Laser-induced chemical vapor deposition of germanium and doped-germanium films
[AD-D012462] N87-15888
Characterization of infrared properties of layer semiconductors
[AD-A172692] N87-15893
INFRARED RADIOMETERS
Contribution of passive microwave remote sensing in soil moisture and evapotranspiration measurements N87-15589
The modulation transfer of the Airborne Version of the Conical Scan Radiometer (AVCSR) N87-15654
INFRARED SPECTRA
Gas particle radiator
[NASA-CASE-LEW-14297-1] N87-15452
COCHISE atmospheric nitrogen/oxygen excitation studies
[AD-A172234] N87-15667
INFRARED SPECTROSCOPY
Mechanical properties versus morphology of ordered polymers, volume 6
[AD-A171221] N87-15307
COCHISE atmospheric nitrogen/oxygen excitation studies
[AD-A172234] N87-15667
Characterization of infrared properties of layer semiconductors
[AD-A172692] N87-15893
INJECTION
An experimental investigation of a circular thrust augmenting ejector
[AD-A172376] N87-15231
INLET FLOW
Viscous analyses for flow through subsonic and supersonic intakes
[NASA-TM-88831] N87-15173
Two- and three-dimensional viscous computations of a hypersonic inlet flow
[NASA-TM-88923] N87-15441
INLET NOZZLES
An experimental investigation of a circular thrust augmenting ejector
[AD-A172376] N87-15231
INPUT
Signal-to-noise ratio requirements for detection of multiple pulses subject to partially correlated fading with chi-squared statistics of various degrees of freedom
[AD-A172223] N87-15405
Irregular wavefronts in data-driven data-dependent computations
[AD-A171151] N87-15727
The power of the queue
[AD-A171536] N87-15732
INSPECTION
Nondestructive methods for the inspection of creep-loaded installations N87-15486
Effects of stress on the ultrasonic response of fatigue cracks
[AERE-R-10854] N87-15497
INSULATORS
Induced insulator voltage in transmitter antenna guy cables
[AD-A169656] N87-15417
INTAKE SYSTEMS
Viscous analyses for flow through subsonic and supersonic intakes
[NASA-TM-88831] N87-15173
INTEGRAL ROCKET RAMJETS
Pressure interactions in supersonic combustion
[AD-A172711] N87-15289
INTERACTIONAL AERODYNAMICS
Wind tunnel data from a rotor wake/airframe interaction study
[AD-A171333] N87-15190
INTERACTIVE CONTROL
The use of interactive voice systems to improve multiple-task performance
[AD-A171492] N87-15703
INTERFACES
Finite element analysis of propagating interface cracks in composites N87-15276
Report of a discussion meeting on the structure of internal interfaces
[DE86-015730] N87-15302
A comparison of two window systems — computer user interfaces N87-15710
Definition of common interfaces. Deliverable D2 of task T2 — computer programming environments N87-15712
Interfaces between LISP and PROLOG. Deliverable D2.A1 of task 2 N87-15713
Interfaces between LISP and A Screen Handler (ASH). Deliverable D2.A2 of task T2 N87-15714
INTERFEROMETERS
Support of Mark 3 optical interferometer
[AD-A171135] N87-15788

INTERFEROMETRY
Problems of the compensation calculation for the interferometry of spatial flows N87-15228
Seeing effects and their calibration for astronomical speckle interferometry N87-15914
INTERGALACTIC MEDIA
Gas rotation above the galactic disk N87-15873
INTERNAL COMBUSTION ENGINES
Composite piston
[NASA-CASE-LAR-13435-1] N87-15464
INTERNATIONAL COOPERATION
Colloquium about Joint Projects within the DFVLR/ISRO Cooperation
[DFVLR-MITT-86-16] N87-15240
Status of ISRO/DFVLR cooperation N87-15241
Possible areas of collaboration between DFVLR and ISRO in the fields of structures and materials N87-15252
Giotto navigation support N87-15354
Frequency spectrum allocation for a potential land mobile-satellite service N87-15380
Institutional aspects: INMARSAT — land mobile satellite service N87-15384
Two years of the International Satellite Land-Surface Climatology Project (ISLSCP) N87-15545
INTERNATIONAL SUN EARTH EXPLORER 3
ICE Second Halley radial: TDA mission support and DSN operations N87-15358
INTERPLANETARY COMMUNICATION
Relative performance of 8.5-GHz and 32-GHz telemetry links on the basis of total data return per pass N87-15337
INTERPROCESSOR COMMUNICATION
A communication bandwidth model for shuffle-exchange and augmented shuffle-exchange interprocessor communication networks
[AD-A171287] N87-15402
INTERSTELLAR MAGNETIC FIELDS
The wrap up problem of the galactic magnetic field N87-15870
Magnetic fields of spiral galaxies N87-15871
Correlative properties of self-exciting fluctuative magnetic fields — solar and galactic magnetic fields N87-15874
INTERSTELLAR MASERS
Time dependent behavior of interstellar maser features due to stimulated scattering through dense plasma clouds N87-15838
INTERSTELLAR MATTER
Laboratory simulation of collisionless coupling between supernova remnants and magnetized interstellar medium N87-15798
Very hot interstellar matter heated by a galactic shock wave N87-15828
INTERSTELLAR SPACE
Laboratory simulation of collisionless coupling between supernova remnants and magnetized interstellar medium N87-15798
Hydrodynamics of interstellar medium including cosmic rays N87-15833
INTERVALS
Human real time perception in noise
[AD-A172374] N87-15699
INVENTIONS
H.R. 4316 and H.R. 3112: Inventions in outer space
[GPO-84-526] N87-15905
INVISCID FLOW
Transonic controversy and regular perturbation methods for subcritical flows N87-15172
ION ACCELERATORS
Resonant ion acceleration by magnetosonic shock waves N87-15827
ION ACOUSTIC WAVES
Influence of reflected ions on the front structure of quasi-perpendicular collisionless shock waves N87-15829
Radiation of ion-acoustic waves by supersonic soliton N87-15868
ION BEAMS
Adhesion, friction, and deformation of ion-beam-deposited boron nitride films
[NASA-TM-88902] N87-15305
An assessment of transport coefficient approximations used in galactic heavy ion shielding calculations
[NASA-TM-89054] N87-15782
Ion acceleration in solar flares enriched by helium-3 and in gamma-ray line flares N87-15808
On low-hybrid turbulence excited by ion streams — plasma turbulence N87-15860
Control of ion-velocity distributions in laser-target interaction experiments
[AD-A172649] N87-15880
ION DENSITY (CONCENTRATION)
Quadrupole ion/neutral mass spectrometer for space shuttle applications: Environmental research papers
[AD-A172275] N87-15265
ION IMPACT
Investigations of the interactions of radiation with matter
[AD-A171232] N87-15779
ION INJECTION
Injection mechanism for the cosmic ray acceleration by shocks N87-15835
IONIC CRYSTALS
Study of transient phonon dynamics
[AD-A172691] N87-15892
IONIZATION
Calculations of heat deposition in a target system bombarded by high energy charged particles
[DE86-700263] N87-15784
IONIZATION COEFFICIENTS
Distortions of power-law of electrons in turbulent plasma reactor — decametric cosmic rays N87-15841
Intense and short pulse electric field (dc and microwave) air breakdown perameters
[AD-A172227] N87-15878
IONIZATION CROSS SECTIONS
Investigations of the interactions of radiation with matter
[AD-A171232] N87-15779
IONIZATION FREQUENCIES
Intense and short pulse electric field (dc and microwave) air breakdown parameters
[AD-A172227] N87-15878
IONIZED GASES
Shuttle contamination modeling: Evolution of ionized shuttle exhaust, environmental research papers
[AD-A172276] N87-15257
IONOSPHERIC DISTURBANCES
Longwave propagation: A brief review
[AD-A171147] N87-15400
IONOSPHERIC PROPAGATION
Longwave propagation: A brief review
[AD-A171147] N87-15400
IONS
Auroral electron acceleration by lower-hybrid waves
[DE86-703346] N87-15858
IRRADIATION
Effect of light-soaking on electronic properties of glow-discharged hydrogenated amorphous silicon N87-15763
Laser-induced chemical vapor deposition of germanium and doped-germanium films
[AD-D012462] N87-15888
ISOTOPE EFFECT
Inelastic gas-surface scattering. Part 2: Results
[AD-A171587] N87-15780
ISOTOPE SEPARATION
Copper vapor lasers for isotope separation N87-15768
Development of a single-mode dye laser pumped by a copper vapor laser N87-15769
ISOTOPIC ENRICHMENT
Development of a single-mode dye laser pumped by a copper vapor laser N87-15769
ISOTOPIC LABELING
The determination of the global average OH concentration using a deuteroethane tracer N87-15539
ISRO
Colloquium about Joint Projects within the DFVLR/ISRO Cooperation
[DFVLR-MITT-86-16] N87-15240
Status of ISRO/DFVLR cooperation N87-15241
Indian remote sensing program N87-15242
ISRO telemetry, tracking and command network (ISTRA) N87-15249

J

JAPANESE SPACE PROGRAM
Pathfinder operations N87-15355
JET ENGINE FUELS
Computational fluid dynamic studies of certain ducted bluff-body flowfields relevant to turbojet combustors. Volume 2: Time-averaged flowfield predictions for a proposed centerbody combustor
[AD-A171169] N87-15447
JET ENGINES
Air breathing jet engines for satellite launcher vehicles. Analysis and comparison of suitable propulsion concepts N87-15226
JOINTS (JUNCTIONS)
Control and simulation of a 3-jointed finger
[DE86-014303] N87-15469
Durability of structural adhesively bonded systems
[AD-A170708] N87-15492
JOSEPHSON JUNCTIONS
Development of NbN Josephson Junction technology
[AD-A171067] N87-15885
JOURNAL BEARINGS
Identification of damping parameters of a squeeze-film bearing
[AD-A169678] N87-15470
JUDGMENTS
Novice rules for assessing importance in scientific texts
[AD-A171551] N87-15698
JUPITER (PLANET)
Magnetospheric tails in the solar planetary system N87-15818
JUPITER PROBES
Plasma outflow and superrotation in the Jovian magnetosphere deduced from Voyager observations N87-15924

K

KALMAN FILTERS
Systolic VLSI for Kalman filters N87-15360
Adaptive modeling of the dynamics of autonomous land vehicles
[AD-A172404] N87-15911
KENYA
Use of remote sensing application for agricultural expansion into semi-arid areas of Kenya N87-15607
KINETIC EQUATIONS
Kinetic equation for Hamiltonian systems integrable in the mean field approximation — globular star clusters N87-15795
Equilibrium and stability of galaxies in binary systems N87-15796
KINETIC THEORY
Linear and nonlinear theory of the Doppler-shifted cyclotron resonance maser based on TE and TM waveguide modes
[AD-A172231] N87-15459
Kinetic equation for Hamiltonian systems integrable in the mean field approximation — globular star clusters N87-15795
Merging instability of magnetic islands N87-15810
KINETICS
Electrochemical reactions with bare metal surfaces and corrosion fatigue crack growth
[AD-A172248] N87-15297
An endochronic rate-sensitive constitutive equation for metals: Application to generalized creep
[AD-A172705] N87-15298
An investigation of the electrode kinetics and electrochemistry of refractory metal deposition
[AD-A171410] N87-15328
Models of cerebral system mechanics
[AD-A171483] N87-15692
KLYSTRONS
Noises of klystron oscillators of a small power
[AD-A170220] N87-15418

L

LAGEOS (SATELLITE)
Lageos orbit decay due to infrared radiation from Earth
[NASA-TM-87804] N87-15665
LAKES
The prospects for hydrological measurements using ERS-1 — lakes N87-15588
Ground water-fed lakes in the Libyan desert: Their varying area as observed by means of LANDSAT-MSS data N87-15611
LAMINAR HEAT TRANSFER
Numerical solution of laminar and turbulent boundary layer equations including transition and experimental study of a flat plate with a blunt fin at incidence
[AD-A172409] N87-15450
LAMINATES
The effects of implanted delaminations on the tensile strength of graphite/epoxy laminates
[AD-A171329] N87-15278
Failure analysis of composite structure materials
[AD-A172236] N87-15279
LAND
Two years of the International Satellite Land-Surface Climatology Project (ISLSCP) N87-15545
WCRP (World Climate Research Program) on Land Surface Processes and Climate: Objectives and requirements N87-15546
Hydrologic models of land surface processes — soil moisture N87-15547
The atmospheric boundary layer and its parameterization N87-15548
Land-surface parameterization in the Japan Meteorological Agency (JMA) operational spectral model N87-15551

Evaluation of climate relevant land surface characteristics from remote sensing N87-15572
Determination of the albedo of inhomogeneous land surfaces N87-15582
Design of a data base system for inferring land surface parameters and fluxes from satellite radiances N87-15625
Future European plans in the framework of the International Satellite Land Surface Climatology Project (ISLSCP) N87-15628
The first International Satellite Land Surface Climatology Project (ISLSCP) Field Experiment - FIFE N87-15629

LAND MOBILE SATELLITE SERVICE
Proceedings of an ESA Workshop on Land Mobile Services by Satellite
[ESA-SP-259] N87-15361
Land mobile communications satellite missions in Europe N87-15362
Land mobile communications satellite N87-15363
Mobile aviation services in the 1545-1559/1646.5-1660.5 MHz band N87-15364
Economic and market aspects of land mobile satellite compared to terrestrial cellular radio N87-15365
Communication by satellites for truck systems N87-15366
Data transmission: A key factor to the efficiency of the transport industry N87-15369
Land mobile satellite communications: Channel model, modulation, and error control N87-15370
PRODAT system architecture — communication network N87-15371
The INMARSAT Standard-C service N87-15372
Low gain antennas for land-mobile terminals N87-15373
Implementation of a land mobile terminal for satellite data communication N87-15374
Advanced regional mobile satellite system for the nineties N87-15375
On-board processing payload technology for an European land mobile satellite system N87-15376
L-band antennas for regional mobile communication satellites N87-15377
Modulation and voice coding for mobile satellite applications N87-15378
Land mobile satellite service: Regulatory aspects — frequency assignment N87-15379
Frequency spectrum allocation for a potential land mobile-satellite service N87-15380
The United States mobile satellite service N87-15381
Spectrum requirements for the land mobile satellite service, INMARSAT N87-15382
Frequency allocation in the land mobile satellite service N87-15383
Institutional aspects: INMARSAT — land mobile satellite service N87-15384
Activities of the European Conference of Posts and Telecommunications (CEPT) special Group on Mobile Communications (GSM) N87-15385
The LOCSTAR satellite radiopositioning system N87-15386
MSAT system and service description — mobile communications N87-15387
A land mobile satellite for digital communications in Europe N87-15388
Land mobile satellite systems using highly eccentric orbits N87-15389

LAND USE
The use of aerial remote sensing in a case study of desertification: Quixabs-PE
[INPE-3963-PRE/980] N87-15519
Indications of the sensitivity of European climate to land use variations using a one-dimensional model N87-15566
Data needs and data bases for climate studies N87-15571
Regional studies with satellite data in Africa on the desertification of the Sudan-Sahel belt in Nigeria N87-15605
The application of LANDSAT imagery for land cover assessment — Thailand N87-15614
Preliminary results of anthropogenic albedo changes over the past 15 years in Eastern Canada N87-15617

LANDING AIDS
Flared landing approach flying qualities. Volume 1: Experiment design and analysis
[NASA-CR-178186-VOL-1] N87-15234

LANDSAT SATELLITES
H.R. 4932: To amend land remote sensing commercialization
[GPO-64-491] N87-15515
Estimation of surface albedo using satellite data. A simple formulation for atmospheric effects N87-15579
Vegetation index models for the assessment of vegetation in marginal areas N87-15584
Vegetation identification and variability in the Tahoua area, Nigeria — LANDSAT thematic mapper N87-15610
Ground water-fed lakes in the Libyan desert: Their varying area as observed by means of LANDSAT-MSS data N87-15611
Assessment of wind and fluvial action by using LANDSAT-MSS color composites in the lower Nile Valley (Egypt) N87-15612
The application of LANDSAT imagery for land cover assessment — Thailand N87-15614
AVHRR and MSS data based vegetation indices studies over Indian sites — NOAA radiometer (AVHRR) LANDSAT multispectral scanner (MSS) N87-15622

LARGE SPACE STRUCTURES
Technology for large space systems: A bibliography with indexes (supplement 15)
[NASA-SP-7046(15)] N87-15239
Possible areas of collaboration between DFVLR and ISRO in the fields of structures and materials N87-15252
Space spider crane
[NASA-CASE-LAR-13411-1] N87-15259
Mobile remote manipulator system for a tetrahedral truss
[NASA-CASE-MSC-20985-1] N87-15260
A model for predicting thermomechanical response of large space structures
[AD-A172966] N87-15264

LASER APPLICATIONS
Intense excitation source of blue-green laser
[AD-A172660] N87-15460
Harmonic conversion of GEKKO 12 high-power Nd:glass laser N87-15767
Copper vapor lasers for isotope separation N87-15768
Development of a single-mode dye laser pumped by a copper vapor laser N87-15769
Laser-induced chemical vapor deposition of germanium and doped-germanium films
[AD-D012462] N87-15888

LASER DOPPLER VELOCIMETERS
Preliminary study of a wing-tip vortex using laser velocimetry
[NASA-TM-88343] N87-15185

LASER INDUCED FLUORESCENCE
Tropospheric HO determination by FAGE N87-15532
Two-photon laser-induced fluorescence detection of OH N87-15533
Copper vapor lasers for isotope separation N87-15768

LASER OUTPUTS
Intense excitation source of blue-green laser
[AD-A172660] N87-15460
The application of laser saturation to the efficient generation of short wavelength radiation from plasmas
[AD-A172945] N87-15462
Optical processing
[AD-A172362] N87-15791
Laser-linewidth effects on the photon-phonon conversion rate at a gas-solid interfaces
[AD-A171469] N87-15886

LASER PUMPING
The application of laser saturation to the efficient generation of short wavelength radiation from plasmas
[AD-A172945] N87-15462
Tropospheric HO determination by FAGE N87-15532
Development of a single-mode dye laser pumped by a copper vapor laser N87-15769
Investigations of the interactions of radiation with matter
[AD-A171232] N87-15779
Study of transient phonon dynamics
[AD-A172691] N87-15892

LASER SPECTROSCOPY
OH measurement by laser light absorption N87-15531

LASER TARGET INTERACTIONS
Control of ion-velocity distributions in laser-target interaction experiments
[AD-A172649] N87-15880

LATTICE VIBRATIONS
Laser-linewidth effects on the photon-phonon conversion rate at a gas-solid interfaces
[AD-A171469] N87-15886
Interatomic interactions in solids: An effective medium approach
[AD-A171518] N87-15887

LAUNCHERS
Development of instrumentation to measure sound speed and flow direction in dusty flow fields
[AD-A171050] N87-15453

LAUNCHING
Investigation of magnetostatic surface waves for anisotropic effects
[AD-A172375] N87-15774

LEACHING
Infusion extractor
[NASA-CASE-MSC-20761-1] N87-15465

LEAD ACID BATTERIES
Program to analyze the failure mode of lead-acid batteries
[NUREG-CR-4833] N87-15415
Stibine filter for antimonial lead acid batteries
[AD-D012427] N87-15419

LEAD COMPOUNDS
Effects of phosphoric acid on the lead-acid battery reactions N87-15772

LEARNING
Attention and preparatory processes in the central nervous system
[AD-A171316] N87-15689

LEAST SQUARES METHOD
Some asymptotic properties of multivariable models identified by equation error techniques
[EUT-85-E-153] N87-15751

LENS DESIGN
The influence of a high index microlens in a laser-taper coupling
[EUT-85-E-155] N87-15792

LETHALITY
Inhalation toxicology. Part 7: Times to incapacitation and death for rats exposed continuously to atmospheric acrolein vapor
[AD-A169666] N87-15680

LIBRARIES
Ada applications to real-time computer systems
[AD-A169493] N87-15723
The facilitation of direct searching of online services by the end user in academic libraries N87-15899
The impact on the OCLC interlibrary loan subsystem on ARL libraries N87-15900

LIBYA
Ground water-fed lakes in the Libyan desert: Their varying area as observed by means of LANDSAT-MSS data N87-15611

LIBYAN DESERT
Ground water-fed lakes in the Libyan desert: Their varying area as observed by means of LANDSAT-MSS data N87-15611

LIE GROUPS
Nonlinear partial differential equations and related problems of pade approximations
[AD-A172253] N87-15748

LIFE (DURABILITY)
Creep fatigue life prediction for engine hot section materials (ISOTROPIC)
[NASA-CR-179550] N87-15491

LIFE SCIENCES
Reference Mission Operational Analysis Document (RMOAD) for the Life Sciences Research Facilities
[NASA-TM-89604] N87-15678
USSR Space Life Sciences Digest, issue 9
[NASA-CR-3922(10)] N87-15679

LIGHT (VISIBLE RADIATION)
Measuring and modeling solar irradiance on vertical surfaces
[DE86-010737] N87-15668

LIGHT SCATTERING METERS
Apparatus for determining the liquid water content of a gas
[AD-D012453] N87-15288

LIGHTNING
An experimental and theoretical study of nuclear-EMP (electromagnetic pulse)-type lightning simulators with combined peaking capacitor and crowbar
[AD-A172648] N87-15407

LIGHTNING SUPPRESSION
International Aerospace and Ground Conference on Lightning and Static Electricity. Technical papers: The key to lightning technology, held in Orlando, Florida on 26-28 June 1984
[AD-A169867] N87-15192

LIMBS (ANATOMY)
A theoretical study of the electromagnetic fields in a limb, excited by artificial sources
[EUT-86-E-156] N87-15694

LINE SPECTRA
X-ray spectroscopy with Z-pinch neon plasmas
[AD-A172228] N87-15879
Laser-linewidth effects on the photon-phonon conversion rate at a gas-solid interfaces
[AD-A171469] N87-15886

LINEAR ACCELERATORS
SLAC pulsed X-ray facility
[DE86-012045] N87-15456

LINEAR CIRCUITS
Investigation of magnetostatic surface waves for anisotropic effects
[AD-A172375] N87-15774

LINEAR EQUATIONS
A new approach to non-invasive oxygenated mixed venous PCO(sub)2 [NASA-CR-171949] N87-15682
Iterative methods and preconditioning for solving large system of linear equations N87-15756
LINEAR SYSTEMS
Linear and nonlinear theory of the Doppler-shifted cyclotron resonance maser based on TE and TM waveguide modes [AD-A172231] N87-15459
LINEARITY
Applicability of linearized-theory attached-flow methods to design and analysis of flap systems at low speeds for thin swept wings with sharp leading edges [NASA-TP-2653] N87-15174
LININGS
Method and apparatus for increasing service life of augmentor and combustion chamber liners [AD-D012443] N87-15273
LIQUID FLOW
Critical flows — liquids N87-15325
LIQUID ROCKET PROPELLANTS
NMR (Nuclear Magnetic Resonance) investigations of liquid propellant systems consisting of alkyl- and hydroxyl-ammonium nitrates. Part 1: Characterization of Carbon-13, proton, and Nitrogen-15 NMR spectra and analytical applications [AD-A171577] N87-15319
LISP (PROGRAMMING LANGUAGE)
Establishment of a common environment. Deliverable D1 of task T1 - second review — computer programming N87-15709
Syntax directed editing of LeLISP. Annexe D1.A3 of deliverable D1 - second review N87-15711
Definition of common interfaces. Deliverable D2 of task T2 — computor programming environments N87-15712
Interfaces between LISP and PROLOG. Deliverable D2.A1 of task 2 N87-15713
Interfaces between LISP and A Screen Handler (ASH). Deliverable D2.A2 of task T2 N87-15714
LITHIUM
Cathode including a non fluorinated linear chain polymer as the binder, method of making the cathode, and lithium electrochemical cell containing the cathode [AD-D012464] N87-15429
LITHIUM ALLOYS
Investigation of the elastic behavior of Al-Li-X alloys [AD-A171224] N87-15295
LITHIUM COMPOUNDS
Method of increasing the useful life of rechargeable lithium batteries [AD-D012444] N87-15421
LOADS (FORCES)
Structural-mechanics behavior of insulating glass units [PB86-234614] N87-15316
LOGIC CIRCUITS
Delay modeling of bipolar ECL/EFL (Emitter-Coupled Logic/Emitter-Follower-Logic) circuits [AD-A171131] N87-15424
LOGISTICS
Economic aspects of communication in road transport N87-15368
LONG TERM EFFECTS
Long-term amplitude and phase stability of the 400-kW 2.115-GHz transmitter N87-15338
LONG WAVE RADIATION
Downward longwave radiation at the surface in clear-sky atmospheres: Comparisons of measured, satellite-derived, and calculated fluxes N87-15578
Determination of the longwave surface net flux from radiances to space N87-15648
LOOPS
A comparison of methods for DPLL loop filter design N87-15342
LOSSES
Signal-to-noise ratio requirements for detection of multiple pulses subject to partially correlated fading with chi-squared statistics of various degrees of freedom [AD-A172223] N87-15405
LOSSY MEDIA
Magnetospheric and solar radiation from loss-cone driven test instabilities N87-15839
LOW ASPECT RATIO
Garrett TFE-731 hp turbine stage without and with cooling-gas injection N87-15210
Low aspect ratio turbine stage without cooling-gas injection N87-15211
Time-resolved heat flux measurement for the rotor blade of a TFA-731-2 hp turbine N87-15212
LOW COST
The INMARSAT Standard-C service N87-15372
Large TV display system [NASA-CASE-NPO-16932-1] N87-15413
LOW GRAVITY MANUFACTURING
Equipment concept design and development plans for microgravity science and applications research on space station: Combustion tunnel, laser diagnostic system, advanced modular furnace, integrated electronics laboratory [NASA-CR-179535] N87-15320
LOW PRESSURE
Soviet research on the transport of intense relativistic electron beams through low-pressure air [AD-A172274] N87-15783
LOW SPEED
Applicability of linearized-theory attached-flow methods to design and analysis of flap systems at low speeds for thin swept wings with sharp leading edges [NASA-TP-2653] N87-15174
Low-speed aerodynamic characteristics of a wing-canard configuration with underwing spanwise blowing on the trailing-edge flap system [NASA-TM-89020] N87-15180
LOW TEMPERATURE
Low heat transfer oxidizer heat exchanger design and analysis [NASA-CR-179488] N87-15272
LUBRICANT TESTS
Carbon residue studies with a micro carbon residue tester [AD-A171153] N87-15306
LUBRICATING OILS
Carbon residue studies with a micro carbon residue tester [AD-A171153] N87-15306
LUBRICATION
Lubricant effects on bearing life [NASA-TM-88875] N87-15467
LUGS
Effect of cold-working by hole expansion on fatigue life of 7075-T7351 and 7475-T761 aluminum lugs with and without initial flaws under maneuver loading spectrum [TAE-561] N87-15291

M

MACH NUMBER
Comparison of turboengine, turborocket, and turbojet engine as propulsion for long range and high Mach numbers N87-15225
Thermal analysis and design of a cooling system for a Mach 14 nozzle [NASA-CR-180096] N87-15271
MAGMA
Meteoritic basalts: The nakhlites, their parental magmas, cooling rates, and equivalents on Earth [NASA-CR-180071] N87-15922
MAGNESIUM ALLOYS
Investigation of the elastic behavior of Al-Li-X alloys [AD-A171224] N87-15295
MAGNETIC FIELD CONFIGURATIONS
Merging instability of magnetic islands N87-15810
Topological stability of magnetic fields in spatial domains with boundaries and finite-length field lines N87-15812
The wrap up problem of the galactic magnetic field N87-15870
Magnetic fields of spiral galaxies N87-15871
On the effect of differential rotation on axisymmetric and nonaxisymmetric magnetic fields of cosmic bodies N87-15876
MAGNETIC FIELD RECONNECTION
Explosive coalescence of current loops and particle acceleration N87-15804
Spontaneous reconnection at the boundaries of planetary magnetospheres N87-15815
Magnetic reconnection, generation of plasma fluxes and accelerated particles in laboratory experiments and space plasma N87-15821
Magnetic boundary and acceleration of charged particles in spatially nonuniform configurations — space plasmas N87-15822
Stochastization of charged particle motion near a magnetic field reversal and the problem of explosive reconnection — magnetotail N87-15823
Spontaneous reconnection in the Earth's magnetotail N87-15825
MAGNETIC FIELDS
Shuttle contamination modeling: Evolution of ionized shuttle exhaust, environmental research papers [AD-A172276] N87-15257
Research for electric energy systems [DE86-012716] N87-15435
Magnetic field generation in celestial objects N87-15872
MAGNETIC FLUX
Generation of plasma flows by oscillations of magnetic flux tubes N87-15803
Propagation of nonlinear modulated Alfven waves in spicules and magnetic flux tubes N87-15809
MAGNETIC INDUCTION
Induced insulator voltage in transmitter antenna guy cables [AD-A169656] N87-15417
MAGNETIC PROPERTIES
Investigation of magnetostatic surface waves for anisotropic effects [AD-A172375] N87-15774
Synthesis and characterization of new low-dimensional metal complex conductors [AD-A172659] N87-15891
MAGNETIC RELAXATION
Magnetic energy dissipation in a rarefied plasma by the relaxation process — solar corona N87-15824
MAGNETIC STARS
The interaction of rotating magnetized stars with accreting plasma N87-15797
MAGNETIC VARIATIONS
Thermosphere structure variations during high solar and magnetic activity conditions [AD-A171350] N87-15686
MAGNETICALLY TRAPPED PARTICLES
Prefiare acceleration by magnetic trapping in shearing arcades — solar flares N87-15811
MAGNETOACOUSTIC WAVES
Acoustic wave collapse effect on the structure of collisionless shock waves in magnetized plasma N87-15861
MAGNETOHYDRODYNAMIC FLOW
Generation of plasma flows by oscillations of magnetic flux tubes N87-15803
The problem of the MHD flow near stagnation point of the current sheet — geomagnetism-solar wind N87-15817
A fluid simulation of the AMPTE neutral gas release in the solar wind N87-15819
Models of the Venus ionospheric flow N87-15820
Alfven vortices in a homogeneous plasma N87-15864
Instability in the system of counterstreaming relativistic plasmas N87-15867
MAGNETOHYDRODYNAMIC STABILITY
Vortices in magnetized plasmas N87-15802
Explosive coalescence of current loops and particle acceleration N87-15804
Merging instability of magnetic islands N87-15810
Magnetic reconnection, generation of plasma fluxes and accelerated particles in laboratory experiments and space plasma N87-15821
Magnetospheric and solar radiation from loss-cone driven test instabilities N87-15839
Wisps in the Crab Nebula N87-15854
Instability in the system of counterstreaming relativistic plasmas N87-15867
MAGNETOHYDRODYNAMIC TURBULENCE
Mass loading and MHD turbulence in the solar wind/comet interaction region N87-15836
MAGNETOHYDRODYNAMIC WAVES
Propagation of nonlinear modulated Alfven waves in spicules and magnetic flux tubes N87-15809
Negative energy vortices in inhomogeneous plasma N87-15863
Alfven vortices in a homogeneous plasma N87-15864
MAGNETOHYDRODYNAMICS
Hydrodynamics of interstellar medium including cosmic rays N87-15833
MAGNETORESISTIVITY
Electromagnetic sensor arrays for nondestructive evaluation and robot control [AD-A171128] N87-15474
MAGNETOSONIC RESONANCE
Resonant ion acceleration by magnetosonic shock waves N87-15827
MAGNETOSPHERE
Plasma outflow and superrotation in the Jovian magnetosphere deduced from Voyager observations N87-15924
MAGNETOSTATIC FIELDS
Topological stability of magnetic fields in spatial domains with boundaries and finite-length field lines N87-15812
Wisps in the Crab Nebula N87-15854
MAGNETOSTATICS
Investigation of magnetostatic surface waves for anisotropic effects [AD-A172375] N87-15774
MAGNIFICATION
Effects of extended camera baseline and image magnification on target detection time and target recognition with a stereoscopic TV system [AD-A171063] N87-15398
MAIN SEQUENCE STARS
Main sequence photometry of globular clusters N87-15920

MAN ENVIRONMENT INTERACTIONS
The use of aerial remote sensing in a case study of desertification: Qukaba-PE
[INPE-3963-PRE/980] N87-15519
The Sahel droughts: 1941-1984 N87-15603
Desertification monitoring: Remotely sensed data for drought impact studies in the Sudan N87-15604
Preliminary results of anthropogenic albedo changes over the past 15 years in Eastern Canada N87-15617
MAN MACHINE SYSTEMS
Data gathering: Cost/time considerations — cartography N87-15509
Spatial scale in image detection and recognition
[AD-A171348] N87-15691
On the pilot's behavior of detecting a system parameter change
[NASA-TM-88479] N87-15695
A comparison of two window systems — computer user interfaces N87-15710
Design of a graphics user interface for a database management system
[AD-A171393] N87-15730
MANAGEMENT INFORMATION SYSTEMS
The creation of an environmental information system for the European Community N87-15510
Systematic corporate planning at DTIC (Defense Technical Information Center)
[AD-A171525] N87-15902
MANAGEMENT METHODS
Investigation of the Challenger accident, volume 1
[GPO-64-295] N87-15256
NASA: The vision and the reality
[OP-5] N87-15898
MANAGEMENT PLANNING
Systematic corporate planning at DTIC (Defense Technical Information Center)
[AD-A171525] N87-15902
MANEUVERS
Subsonic maneuver capability of a supersonic cruise fighter wing concept
[NASA-TP-2642] N87-15184
MANIPULATORS
Space spider crane
[NASA-CASE-LAR-13411-1] N87-15259
Mobile remote manipulator system for a tetrahedral truss
[NASA-CASE-MSC-20985-1] N87-15260
Control and simulation of a 3-jointed finger
[DE86-014303] N87-15469
End-point control of flexible manipulators
[AD-A172287] N87-15471
Adaptive control of robotic manipulators N87-15700
MAPPING
DSN microwave antenna holography. Part 2: Data processing and display of high-resolution effective maps N87-15339
Defense Mapping Agency advanced raster-to-Vector benchmark testing
[AD-A171575] N87-15734
MARECS MARITIME SATELLITES
PRODAT system architecture — communication network N87-15371
MARINE METEOROLOGY
Cloud detection and classification over oceans at night with NOAA-7 N87-15651
MARINE PROPULSION
Cloud cavitation and collective bubble dynamics
[AD-A170692] N87-15446
MARITIME SATELLITES
Economic and market aspects of land mobile satellite compared to terrestrial cellular radio N87-15365
The INMARSAT Standard-C service N87-15372
MARKET RESEARCH
Proceedings of an ESA Workshop on Land Mobile Services by Satellite
[ESA-SP-259] N87-15361
Land mobile communications satellite missions in Europe N87-15362
MARS ATMOSPHERE
Propagation through Martian dust at 8.5 and 32 GHz N87-15359
MASERS
Linear and nonlinear theory of the Doppler-shifted cyclotron resonance maser based on TE and TM waveguide modes
[AD-A172231] N87-15459
MASS FLOW
An experimental investigation of a circular thrust augmenting ejector
[AD-A172376] N87-15231
MASS FLOW RATE
Plasma outflow and superrotation in the Jovian magnetosphere deduced from Voyager observations N87-15924
MASS SPECTROMETERS
Quadrupole ion/neutral mass spectrometer for space shuttle applications: Environmental research papers
[AD-A172275] N87-15265
Vacuum ultraviolet photochemistry
[DE86-015768] N87-15282
MASS TRANSFER
Aging of polyurethane foams, the influence of gas diffusion on thermal conductivity
[DE86-014339] N87-15314
The detailed mathematical prediction of simultaneous heat and mass transfer in cavities N87-15440
MATCHING
Tight bounds for minimax grid matching, with applications to the average case analysis of algorithms
[AD-A171552] N87-15733
MATHEMATICAL MODELS
Assessment of two fast codes used for preliminary aerodynamic design of guided projectiles
[AD-A171276] N87-15255
Critical flows — liquids N87-15325
Development of Ku-band rendezvous radar tracking and acquisition simulation programs
[NASA-CR-171950] N87-15392
Transformation of the logic of a thematic map construction model to a user interface in automated cartography N87-15501
Effects of the oceans on polar motion: Extended investigations
[NASA-CR-180066] N87-15677
Nonsequential computation and laws of nature
[AD-A171505] N87-15731
The stationary autogressive model
[AD-A171416] N87-15753
Statistical mechanics of one-dimensional systems. 4: Generalization of the hard-core repulsion in multicomponent gases N87-15755
Application of Barlow-Wu systems to safety monitoring systems N87-15757
Real time optimization of thin plate TIG arc welding N87-15759
Natural convection of stably stratified fluid layer with uniform heating from below N87-15771
A rubidium clock model
[AD-A171133] N87-15773
MATHEMATICS
Space mathematics: A resource for secondary school teachers
[NASA-EP-175] N87-15742
MATRICES (MATHEMATICS)
Finite element analysis of propagating interface cracks in composites N87-15276
Effects of the oceans on polar motion: Extended investigations
[NASA-CR-179986] N87-15676
MAXWELL EQUATION
Statistical mechanics of one-dimensional systems. 4: Generalization of the hard-core repulsion in multicomponent gases N87-15755
MEASURING INSTRUMENTS
Non-reference analysis of rotational accuracy with nanometer resolution on ultraprecision spindle N87-15770
Chemistry of the outer planets: Investigations of the chemical nature of the atmosphere of Titan
[NASA-CR-180072] N87-15927
MECHANICAL DRIVES
New generation methods for spur, helical, and spiral-bevel gears
[NASA-TM-88862] N87-15466
MECHANICAL ENGINEERING
Technology Reports of the Osaka University, volume 36, nos. 1844-1864
[ISSN-0030-6177] N87-15754
MECHANICAL PROPERTIES
Seat experiment results of full-scale transport aircraft controlled impact demonstration
[AD-A172245] N87-15193
Corrosion and stress corrosion of steel pressure boundary components and steam turbines
[DE86-780555] N87-15293
Mechanical properties versus morphology of ordered polymers, volume 6
[AD-A171221] N87-15307
MELTS (CRYSTAL GROWTH)
Chalcogenide glasses. Part 4: Crystallization and glass transition characteristics in AS(2-x)Sb(x)S(3) glass-forming system
[AD-A171564] N87-15310
MENSTRUATION
Bedrest in healthy women: Effects of menstrual function and oral contraceptives
[NASA-CR-171946] N87-15681
MESOSCALE PHENOMENA
Vegetation index and surface temperature in a mesoscale climate model — Alps N87-15592
Utilization of satellite data in mesoscale modeling of severe weather
[NASA-CR-179917] N87-15669
Verification of mesoscale objective analyses of VAS and rawinsonde data using the March 1982 AVE/VAS special network data
[NASA-CR-179988] N87-15670
Utilization of VAS satellite data in the initialization of an oceanic-cyclogenesis simulation
[NASA-CR-180140] N87-15671
MESSAGES
The INMARSAT Standard-C service N87-15372
The LOCSTAR satellite radiopositioning system N87-15386
METAL BONDING
Composite piston
[NASA-CASE-LAR-13435-1] N87-15464
METAL COATINGS
An investigation of the electrode kinetics and electrochemistry of refractory metal deposition
[AD-A171410] N87-15328
METAL FATIGUE
Electrochemical reactions with bare metal surfaces and corrosion fatigue crack growth
[AD-A172248] N87-15297
METAL IONS
Development of N(2) sensor for determination of PN(2) in body tissues
[AD-A171330] N87-15690
METAL MATRIX COMPOSITES
Metallurgical variables influencing the corrosion susceptibility of P/M (Powder Metallurgy) 7091 Aluminum/SiCw composite
[AD-A170946] N87-15294
METAL PLATES
FEM model of 3D transient temperature and stress fields in welded plates N87-15476
METAL VAPOR LASERS
Copper vapor lasers for isotope separation N87-15768
METALLURGY
Technology Reports of the Osaka University, volume 36, nos. 1844-1864
[ISSN-0030-6177] N87-15754
METALS
LaRC conceptual design of solid rocket booster in-line bolted joint
[NASA-TM-89046] N87-15177
Report of a discussion meeting on the structure of internal interfaces
[DE86-015730] N87-15302
Stress rates in continuum mechanics and computer codes
[AD-A172704] N87-15495
METEORITE CRATERS
Astroblemes on trapp rock: Structural features and differences from impact structures on other targets
[NASA-TM-88484] N87-15921
METEORITES
Meteoritic basalts: The nakhlites, their parental magmas, cooling rates, and equivalents on Earth
[NASA-CR-180071] N87-15922
METEORITIC MICROSTRUCTURES
Astroblemes on trapp rock: Structural features and differences from impact structures on other targets
[NASA-TM-88484] N87-15921
METEOROLOGICAL BALLOONS
Tethered balloon measurements at San Nicolas Island (October 1984): Instrumentation, data summary, preliminary data interpretation
[AD-A172226] N87-15674
METEOROLOGICAL FLIGHT
Regional measurements of evapotranspiration using aircraft mounted sensors N87-15598
METEOROLOGICAL INSTRUMENTS
Tethered balloon measurements at San Nicolas Island (October 1984): Instrumentation, data summary, preliminary data interpretation
[AD-A172226] N87-15674
METEOROLOGICAL PARAMETERS
The initialization and use of prognostic land-surface values in the French operational forecast system — weather forecasting N87-15553
Remote sensing of land-surface temperature from HIRS/MSU data — High Resolution Infrared Sounder/Microwave Sounding Unit (HIRS/MSU) N87-15573
An objective monitoring method for African rainfall based on Meteosat VIS and IR images — visible images (vis) N87-15586
Nowcasting thermodynamic profiles using a triangle of wind profilers in an advection model
[AD-A171288] N87-15673

Tethered balloon measurements at San Nicolas Island (October 1984): Instrumentation, data summary, preliminary data interpretation
[AD-A172226] N87-15674

METEOROLOGICAL SATELLITES
Future European plans in the framework of the International Satellite Land Surface Climatology Project (ISLSCP)
N87-15628
Global and atmospheric radiation at ground from satellite data
N87-15637

METEOSAT SATELLITE
An objective monitoring method for African rainfall based on Meteosat VIS and IR images — visible images (vis)
N87-15586
Rainfall estimation over the Sahel using Meteosat thermal infra-red data
N87-15587
Group Agromet Monitoring Project (GAMP) methodology integrated mapping of rainfall, evapotranspiration, germination, biomass development and thermal inertia, based on Meteosat and conventional meteorological data
N87-15626
A cloud climatology for the South Atlantic derived from Meteosat data
N87-15633
Errors and uncertainties in satellite derived albedo — Meteosat
N87-15643
Estimate of broadband conversion factors for the Meteosat VIS channel
N87-15653

MICROCOMPUTERS
Ada applications to real-time computer systems
[AD-A169493] N87-15723
A decision support system for space technology tradeoffs: A microcomputer application
[AD-A172379] N87-15910

MICROELECTRONICS
The use of microdielectrometry in monitoring the cure of carbon-epoxy prepreg
[AD-A172304] N87-15280
Digital simulation of the measured electrochemical response of reversible redox couples at microelectrode arrays: Consequences arising from closely spaced ultramicroelectrodes
[AD-A171181] N87-15425
Digital simulation of the measured electrochemical response of reversible redox couples at microelectrode arrays: Consequences arising from closely spaced ultramicroelectrodes
[AD-A171272] N87-15427
PH sensitive WO3-Based microelectrochemical transistors
[AD-A172563] N87-15432
Modification of microelectrode arrays: New microelectrochemical devices for sensor applications
[AD-A171180] N87-15454

MICROSTRIP TRANSMISSION LINES
Millimeter wave microstrip circulator utilizing hexagonal ferrites
[AD-D012445] N87-15422

MICROSTRUCTURE
Ultrasonic backscatter and attenuation measurements for microstructure characterization: Application to consolidated rapidly solidified type 304 stainless steel powder
[DE86-014917] N87-15300
Mechanical properties versus morphology of ordered polymers, volume 6
[AD-A171221] N87-15307
Chalcogenide glasses. Part 4: Crystallization and glass transition characteristics in AS(2-x)Sb(x)S(3) glass-forming system
[AD-A171564] N87-15310

MICROWAVE AMPLIFIERS
Linear and nonlinear theory of the Doppler-shifted cyclotron resonance maser based on TE and TM waveguide modes
[AD-A172231] N87-15459
Josephson effect detectors of microwave and far infrared radiation
[AD-A171539] N87-15889

MICROWAVE ANTENNAS
DSN microwave antenna holography. Part 2: Data processing and display of high-resolution effective maps
N87-15339
X-band uplink feedcone capabilities, components, and layout
N87-15344

MICROWAVE ATTENUATION
Propagation through Martian dust at 8.5 and 32 GHz
N87-15359

MICROWAVE EMISSION
A new algorithm for microwave delay estimation from water vapor radiometer data
N87-15345

MICROWAVE EQUIPMENT
Microwave pulse compression in dispersive plasmas
[AD-D012426] N87-15877

MICROWAVE OSCILLATORS
Noises of klystron oscillators of a small power
[AD-A170220] N87-15418
Linear and nonlinear theory of the Doppler-shifted cyclotron resonance maser based on TE and TM waveguide modes
[AD-A172231] N87-15459

MICROWAVE RADIOMETERS
SABREX: A 90 GHz radiometer experiment on a Rohini satellite — Satellite Borne Radiometer Experiment (SABREX)
N87-15243
Contribution of passive microwave remote sensing in soil moisture and evapotranspiration measurements
N87-15589
Observations of the seasonal variability of soil moisture and vegetation cover over Africa using satellite microwave radiometry
N87-15593

MICROWAVE TRANSMISSION
Josephson effect detectors of microwave and far infrared radiation
[AD-A171539] N87-15889

MICROWAVE TUBES
Research program on a compact and high-power microwave tube
[AD-A171567] N87-15430

MICROWAVES
Intense and short pulse electric field (dc and microwave) air breakdown parameters
[AD-A172227] N87-15878

MIE SCATTERING
Propagation through Martian dust at 8.5 and 32 GHz
N87-15359

MILITARY OPERATIONS
The unmanned air reconnaissance system
[AD-A171165] N87-15206
Proceedings of the 40th Anniversary of the Joint Services Electronics Program
[AD-A171610] N87-15431
Implications of the strategic defense initiative for ABM treaty
[AD-A171145] N87-15909

MILLIMETER WAVES
Investigation of millimeter wave propagation in the atmosphere
[AD-A171526] N87-15404
Millimeter wave microstrip circulator utilizing hexagonal ferrites
[AD-D012445] N87-15422

MINIMAX TECHNIQUE
Tight bounds for minimax grid matching, with applications to the average case analysis of algorithms
[AD-A171552] N87-15733

MINKOWSKI SPACE
Spontaneous compactification of extra dimensions in eleven-dimensional quantum gravity
[DE86-702620] N87-15895

MIRAGE 3 AIRCRAFT
Effect of sonic boom on avalanches. Preparation for flight of a supersonic jet over the Lavay Valley
[NASA-TM-88535] N87-15775

MIRRORS
Self-induced frequency scanning and distributed bragg reflection in semiconductor lasers with phase-conjugate feedback
[AD-A172933] N87-15461
Self-clamping arc light reflector for welding torch
[NASA-CASE-MFS-29207-1] N87-15786

MISALIGNMENT
New generation methods for spur, helical, and spiral-bevel gears
[NASA-TM-88862] N87-15466

MISSILES
The secret of guided missile re-entry
[AD-A169598] N87-15254

MISSING MASS (ASTROPHYSICS)
Cosmions and galaxy formation
N87-15799

MIXING
Theoretical studies in free-electron lasers
[AD-A171174] N87-15458

MIXING HEIGHT
Natural convection of stably stratified fluid layer with uniform heating from below
N87-15771

MOBILE COMMUNICATION SYSTEMS
Ground plane interference elimination by passive element
[NASA-CASE-NPO-16632-1-CU] N87-15390

MODELS
A comparison of the acoustic and aerodynamic measurements of a model rotor tested in two anechoic wind tunnels
[NASA-TM-88364] N87-15178
A cost-performance model for ground-based optical communications receiving telescopes
N87-15336
Canopy reflectance modeling in a tropical wooded grassland
[NASA-CR-180097] N87-15518

MODULATION TRANSFER FUNCTION
The modulation transfer of the Airborne Version of the Conical Scan Radiometer (AVCSR)
N87-15654

MOISTURE
Verification of mesoscale objective analyses of VAS and rawinsonde data using the March 1982 AVE/VAS special network data
[NASA-CR-179988] N87-15670

MOISTURE CONTENT
Apparatus for determining the liquid water content of a gas
[AD-D012453] N87-15288
Modeling energy flow and nutrient cycling in natural semiarid grassland ecosystems with the aid of thematic mapper data
[NASA-CR-179903] N87-15517

MOLECULAR BEAM EPITAXY
Fundamental aspects of heterojunction bipolar transistor technology
[AD-A171225] N87-15426

MOLECULAR CLOUDS
Problems of cosmic ray acceleration in giant molecular clouds
N87-15834

MOLECULAR EXCITATION
MOPAC manual (version 3.10): A general molecular orbital package, IBM-PC version, 1st edition
[AD-A172361] N87-15313
COCHISE atmospheric nitrogen/oxygen excitation studies
[AD-A172234] N87-15667

MOLECULAR INTERACTIONS
Synthesis and characterization of new low-dimensional metal complex conductors
[AD-A172659] N87-15891

MOLECULAR ORBITALS
MOPAC manual (version 3.10): A general molecular orbital package, IBM-PC version, 1st edition
[AD-A172361] N87-15313

MOLECULAR ROTATION
Remote detection of OH
N87-15536

MOLECULAR STRUCTURE
The barium iron ruthenium oxide system
[NASA-TM-88451] N87-15284

MOLNIYA SATELLITES
Land mobile satellite systems using highly eccentric orbits
N87-15389

MOLYBDENUM ALLOYS
Fracture mechanics and creep crack growth in steel of the type 1%Cr0.5Mo, with or without preceeding exposure under creep crack circumstances
N87-15488

MONITORS
Small, self-contained aircraft fatigue data recorder
[AD-A172400] N87-15207
Radio frequency monitoring of turbine generators
N87-15412
Application of Barlow-Wu systems to safety monitoring systems
N87-15757

MONKEYS
Biochemical changes in bone in a model of weightlessness
[NASA-CR-180095] N87-15683

MONSOONS
Variation of skin temperature in desert regions in the neighbourhood of India in relation to Asian monsoon circulation
N87-15620

MONTE CARLO METHOD
Monte Carlo simulation of particle acceleration by shock waves — cosmic plasma
N87-15830

MORPHOLOGY
Mechanical properties versus morphology of ordered polymers, volume 6
[AD-A171221] N87-15307
Mountain building processes in the Central Andes
[NASA-CR-180099] N87-15661

MORTALITY
Exploratory study of the potential effects of exposure to sonic boom on human health. Volume 2: Epidemiological study
[AD-A170953] N87-15686

MOTION PERCEPTION
The perception of the higher derivatives of visual motion
[AD-A171076] N87-15687

MOTIVATION
Attention and preparatory processes in the central nervous system
[AD-A171316] N87-15689

MOTOR VEHICLES
Map data requirement for civil land vehicle navigation and location synopsis
N87-15511

MULTIPATH TRANSMISSION
Distributed control in computer networks and cross-sections of colored multidimensional bodies
[AD-A172224] N87-15740

MULTIPHASE FLOW
Multiphase problems related to safety studies in the process industries
N87-15324

MULTIPLIERS
A generalized algorithm to design finite field normal basis multipliers N87-15343
MULTIPROCESSING (COMPUTERS)
A programming environment for parallel vision algorithms
[AD-A171561] N87-15739
Distributed control in computer networks and cross-sections of colored multidimensional bodies
[AD-A172224] N87-15740
MULTISPECTRAL BAND SCANNERS
Ground water-fed lakes in the Libyan desert: Their varying area as observed by means of LANDSAT-MSS data N87-15611
The modulation transfer of the Airborne Version of the Conical Scan Radiometer (AVCSR) N87-15654

N

NAMING
A decentralized naming facility
[AD-A170937] N87-15725
NARROWBAND
Modulation and voice coding for mobile satellite applications N87-15378
NASA PROGRAMS
NASA authorizations, fiscal year 1987
[GPO-61-975] N87-15904
Department of Housing and Urban Development, and certain independent agencies appropriations for fiscal year 1987, part 2
[S-HRG-99-707-PT-2] N87-15906
National Aeronautics and Space Administration N87-15907
National Aeronautics and Space Administration N87-15908
NASA SPACE PROGRAMS
Giotto navigation support N87-15354
Pathfinder operations N87-15355
VEGA Pathfinder navigation for Giotto Halley encounter N87-15356
NASA: The vision and the reality
[OP-5] N87-15898
NAVIER-STOKES EQUATION
A locally implicit method for fluid flow problems
[NASA-CR-178969] N87-15443
Computational fluid dynamic studies of certain ducted bluff-body flowfields relevant to turbojet combustors. Volume 2: Time-averaged flowfield predictions for a proposed centerbody combustor
[AD-A171169] N87-15447
An 1 sup (p) theory for the n-dimensional, stationary, compressible, Navier-Stokes equations, and the incompressible limit for compressible fluids. The equilibrium solutions
[AD-A172778] N87-15451
NAVIGATION
Longwave propagation: A brief review
[AD-A171147] N87-15400
NAVIGATION AIDS
Map data requirement for civil land vehicle navigation and location synopsis N87-15511
NAVY
Noise susceptibility: A comparison of two Naval aviator populations
[AD-A172222] N87-15693
NEAR WAKES
The effect of wake passing on turbine blades N87-15221
NEBRASKA
Comparison of measured and modeled radiation, heat and water vapor fluxes: FIFE pilot study
[NASA-CR-179989] N87-15516
NEON
X-ray spectroscopy with Z-pinch neon plasmas
[AD-A172228] N87-15879
NERVOUS SYSTEM
Intracortical interactions in visual processing
[AD-A169674] N87-15684
NETWORK ANALYSIS
The effectiveness of Jackson networks as control variates for queueing network simulation
[AD-A171280] N87-15728
NETWORK CONTROL
Advanced regional mobile satellite system for the nineties N87-15375
Distributed control in computer networks and cross-sections of colored multidimensional bodies
[AD-A172224] N87-15740
NEURONS
Intracortical interactions in visual processing
[AD-A169674] N87-15684
NEUTRAL ATMOSPHERES
Quadrupole ion/neutral mass spectrometer for space shuttle applications: Environmental research papers
[AD-A172275] N87-15265
NEUTRAL GASES
A fluid simulation of the AMPTE neutral gas release in the solar wind N87-15819
NEUTRINOS
Collective interactions of neutrinos with dense astrophysical plasmas N87-15837
NEUTRON IRRADIATION
Tensile behavior of helium-implanted and neutron-irradiated V-15Cr-5Ti
[DE86-007301] N87-15292
NEUTRON SCATTERING
Calculations of heat deposition in a target system bombarded by high energy charged particles
[DE86-700263] N87-15784
NEUTRON STARS
Quantum effects in synchronization radiation of a plasma in superstrong magnetic fields of neutron stars N87-15846
NEW MEXICO
Estimation of vegetation cover at subpixel resolution using LANDSAT data
[NASA-CR-177077] N87-15514
NICKEL ALLOYS
High temperature monotonic and cyclic deformation in a directionally solidified nickel-base superalloy
[NASA-CR-175101] N87-15303
NICKEL OXIDES
Study of nickel hydroxide electrodes. 2: Oxidation products of nickel (2) hydroxides
[NASA-TM-88473] N87-15418
NIGER
Hydrological studies in Niger N87-15609
Vegetation identification and variability in the Tahoua area, Nigeria — LANDSAT thematic mapper N87-15610
NIGERIA
Regional studies with satellite data in Africa on the desertification of the Sudan-Sahel belt in Nigeria N87-15605
NIGHT SKY
Cloud detection and classification over oceans at night with NOAA-7 N87-15651
NIGHTGLOW
Investigation on the intensity progression of F-region nightglow emission of the oxygen red line by means of atmospheric gravity waves soliton N87-15816
NIMBUS 7 SATELLITE
Observations of the seasonal variability of soil moisture and vegetation cover over Africa using satellite microwave radiometry N87-15593
NITROGEN
COCHISE atmospheric nitrogen/oxygen excitation studies
[AD-A172234] N87-15667
Development of N(2) sensor for determination of PN(2) in body tissues
[AD-A171330] N87-15690
NITROGEN ISOTOPES
NMR (Nuclear Magnetic Resonance) investigations of liquid propellant systems consisting of alkyl- and hydroxyl-ammonium nitrates. Part 1: Characterization of Carbon-13, proton, and Nitrogen-15 NMR spectra and analytical applications
[AD-A171577] N87-15319
NITROUS OXIDES
COCHISE atmospheric nitrogen/oxygen excitation studies
[AD-A172234] N87-15667
NOAA SATELLITES
Remote sensing of land-surface temperature from HIRS/MSU data — High Resolution Infrared Sounder/Microwave Sounding Unit (HIRS/MSU) N87-15573
Solar irradiance at the Earth's surface from NOAA satellites N87-15577
Satellite-derived vegetation index over Europe N87-15583
AVHRR and MSS data based vegetation indices studies over Indian sites — NOAA radiometer (AVHRR) LANDSAT multispectral scanner (MSS) N87-15622
Short wave radiative fluxes at surface from NOAA satellites N87-15638
NOAA 7 SATELLITE
Calibration of normalized vegetation index against pasture growth — NOAA-7 data N87-15585
Cloud detection and classification over oceans at night with NOAA-7 N87-15651
NOISE (SOUND)
Cloud cavitation and collective bubble dynamics
[AD-A170692] N87-15446
Human real time perception in noise
[AD-A172374] N87-15699
NOISE INTENSITY
Noise susceptibility: A comparison of two Naval aviator populations
[AD-A172222] N87-15693
NOISE MEASUREMENT
Table look-up estimation of signal and noise parameters from quantized observables N87-15341
NOISE REDUCTION
Noises of klystron oscillators of a small power
[AD-A170220] N87-15418
NOISE TEMPERATURE
PPM/NAR 8.4-GHz noise temperature statistics for DSN 64-meter antennas, 1982-1984 N87-15350
NONDESTRUCTIVE TESTS
Failure analysis of composite structure materials
[AD-A172236] N87-15279
Electromagnetic sensor arrays for nondestructive evaluation and robot control
[AD-A171128] N87-15474
Signal processing in ultrasonic NDE (nondestructive evaluation)
[AD-A172687] N87-15475
Nondestructive methods for the inspection of creep-loaded installations N87-15486
Ultrasonic scattering and nondestructive evaluation of defects
[AD-A172258] N87-15494
NONEQUILIBRIUM FLOW
An experimental investigation of wall pressure fluctuations beneath non-equilibrium turbulent flows
[AD-A171508] N87-15449
NONLINEAR SYSTEMS
Theoretical studies in free-electron lasers
[AD-A171174] N87-15458
Linear and nonlinear theory of the Doppler-shifted cyclotron resonance maser based on TE and TM waveguide modes
[AD-A172231] N87-15459
Nonlinear optical apparatus using optical fibers
[AD-D012439] N87-15787
NONLINEARITY
Limit cycles in digital filters: A bibliography 1975-1984
[EUT-85-E-154] N87-15411
Electron nonlinearities and rapid wave processes in cosmic and laboratory plasmas N87-15859
NONUNIFORM FLOW
TRANDESNF: A computer program for transonic airfoil design and analysis in nonuniform flow
[NASA-CR-4044] N87-15186
NOWCASTING
Nowcasting thermodynamic profiles using a triangle of wind profilers in an advection model
[AD-A171288] N87-15673
NUCLEAR FUSION
Harmonic conversion of GEKKO 12 high-power Nd:glass laser N87-15767
Topics in cosmology and particle physics
[DE86-014830] N87-15923
NUCLEAR MAGNETIC RESONANCE
NMR (Nuclear Magnetic Resonance) investigations of liquid propellant systems consisting of alkyl- and hydroxyl-ammonium nitrates. Part 1: Characterization of Carbon-13, proton, and Nitrogen-15 NMR spectra and analytical applications
[AD-A171577] N87-15319
NUCLEAR PHYSICS
Technology Reports of the Osaka University, volume 36, nos. 1844-1864
[ISSN-0030-6177] N87-15754
NUCLEAR POWER PLANTS
Program to analyze the failure mode of lead-acid batteries
[NUREG-CR-4833] N87-15415
NUCLEAR POWER REACTORS
Transactions of the symposia on space nuclear power systems: Summaries
[DE86-005726] N87-15785
NUCLEI (NUCLEAR PHYSICS)
Topics in cosmology and particle physics
[DE86-014830] N87-15923
NULL ZONES
Degradation in performance of adaptive null-steering antennas
[AD-A169663] N87-15396
NUMBER THEORY
Minimum points and views for the recovery of 3-dimensional structure
[AD-A171148] N87-15696
NUMERICAL ANALYSIS
Natural convection of stably stratified fluid layer with uniform heating from below N87-15771
NUMERICAL CONTROL
Real time optimization of thin plate TIG arc welding N87-15759

NUMERICAL INTEGRATION
Perturbation solutions of the equations of motion for a class of dual-spin spacecraft N87-15258
NUTRIENTS
Modeling energy flow and nutrient cycling in natural semiarid grassland ecosystems with the aid of thematic mapper data
[NASA-CR-179903] N87-15517

O

OBSERVATION
Table look-up estimation of signal and noise parameters from quantized observables N87-15341
OCCLUSION
The effect of long term monocular occlusion on vernier threshold: Elasticity in the young adult visual system
[AD-A171289] N87-15688
OCEAN CURRENTS
Effects of the oceans on polar motion: Extended investigations
[NASA-CR-179986] N87-15676
OCEAN MODELS
Emissivity as a function of surface roughness: A computer model
[AD-A172230] N87-15790
OCEAN SURFACE
Determination of the longwave surface net flux from radiances to space N87-15648
Emissivity as a function of surface roughness: A computer model
[AD-A172230] N87-15790
ODORS
Control of H2S emissions using an ozone oxidation process: Preliminary results
[NASA-TM-88475] N87-15525
OMNIDIRECTIONAL ANTENNAS
Highly decoupled cosited antennas
[AD-D012446] N87-15399
ON-LINE SYSTEMS
The facilitation of direct searching of online services by the end user in academic libraries N87-15899
The impact on the OCLC interlibrary loan subsystem on ARL libraries N87-15900
ONBOARD DATA PROCESSING
A flight demonstration program on space data handling N87-15246
APC: A concept demonstration of end-to-end packetized data transportation techniques N87-15247
Communication by satellites for truck systems N87-15366
On-board processing payload technology for an European land mobile satellite system N87-15376
OPERATIONAL HAZARDS
Two Phase Flows in Major Technological Hazards, volume 1 — conference
[VKI-LS-1986-03-VOL-1] N87-15321
OPERATOR PERFORMANCE
Use of disjunctive response requirements in dual-task environments: Implications for automation
[AD-A171277] N87-15702
OPERATORS (PERSONNEL)
Mass digitization: The old way. Experiences with a manual digitizing system — cartography N87-15503
OPTICAL COMMUNICATION
A synchronization technique for optical PPM signals N87-15332
Received optical power calculations for optical communications link performance analysis N87-15333
Fraunhofer filters to reduce solar background for optical communications N87-15335
A cost-performance model for ground-based optical communications receiving telescopes N87-15336
The influence of a high index microlens in a laser-taper coupling
[EUT-85-E-155] N87-15792
OPTICAL COUPLING
The influence of a high index microlens in a laser-taper coupling
[EUT-85-E-155] N87-15792
OPTICAL EQUIPMENT
Optical processing
[AD-A172382] N87-15791
OPTICAL FILTERS
Fraunhofer filters to reduce solar background for optical communications N87-15335
Nonlinear optical apparatus using optical fibers
[AD-D012439] N87-15737
OPTICAL MEASUREMENT
OH radical measurements by optical absorption spectroscopy N87-15530
Magnetic fields of hot stars: Observation methods and results N87-15800
OPTICAL PATHS
Optical processing
[AD-A172382] N87-15791
OPTICAL PROPERTIES
Theoretical studies in free-electron lasers
[AD-A171174] N87-15458
Optical processing
[AD-A172382] N87-15791
Preparation and characterization of several 2-4-V2 stannite single crystals
[AD-A172238] N87-15890
OPTICAL PUMPING
Intense excitation source of blue-green laser
[AD-A172660] N87-15460
OPTICAL SCANNERS
Status of launch vehicle, satellite and mission related activities for MEOSS — Mono Electro-Optical Stereo Scanner (MEOSS) N87-15244
Presentation of the status of the experiment Monocular Electro-Optical Stereo Scanner (MEOSS) N87-15245
Self-induced frequency scanning and distributed bragg reflection in semiconductor lasers with phase-conjugate feedback
[AD-A172933] N87-15461
OPTICAL WAVEGUIDES
Integrated optic modules for multichannel deflection/switching and signal processing
[AD-A171178] N87-15789
OPTIMAL CONTROL
Maximum-terminal-velocity guidance for a hypersonic glider N87-15202
Optimization of closed loop eigenvalues: Maneuvering, vibration control and structure/control design iteration for flexible spacecraft
[AD-A172716] N87-15263
OPTIMIZATION
Interdisciplinary and multilevel optimum design
[NASA-TM-89077] N87-15205
Optimization of continuum structures using a boundary element formulation N87-15705
Approaches to optimization/simulation problems
[DE86-012758] N87-15736
Real time optimization of thin plate TIG arc welding N87-15759
ORBIT DECAY
Lageos orbit decay due to infrared radiation from Earth
[NASA-TM-87804] N87-15665
ORBITAL ASSEMBLY
Space spider crane
[NASA-CASE-LAR-13411-1] N87-15259
Mobile remote manipulator system for a tetrahedral truss
[NASA-CASE-MSC-20985-1] N87-15260
ORBITAL SPACE STATIONS
Space station experiment definition: Advanced power system test bed
[NASA-CR-179502] N87-15270
Reference Mission Operational Analysis Document (RMOAD) for the Life Sciences Research Facilities
[NASA-TM-89604] N87-15678
National Aeronautics and Space Administration N87-15908
OROGRAPHY
Vegetation index and surface temperature in a mesoscale climate model — Alps N87-15592
OSCILLATORS
Fundamental aspects of heterojunction bipolar transistor technology
[AD-A171225] N87-15426
Josephson effect detectors of microwave and far infrared radiation
[AD-A171539] N87-15889
OUTLET FLOW
Development of an artificial boundary layer for different outlet flows N87-15167
OXIDATION
Control of H2S emissions using an ozone oxidation process: Preliminary results
[NASA-TM-88475] N87-15525
Peroxy radical detection by chemical amplification (PERCA) N87-15540
OXIDATION-REDUCTION REACTIONS
Digital simulation of the measured electrochemical response of reversible redox couples at microelectrode arrays: Consequences arising from closely spaced ultramicroelectrodes, revision
[AD-A170943] N87-15423
Digital simulation of the measured electrochemical response of reversible redox couples at microelectrode arrays: Consequences arising from closely spaced ultramicroelectrodes
[AD-A171181] N87-15425
Digital simulation of the measured electrochemical response of reversible redox couples at microelectrode arrays: Consequences arising from closely spaced ultramicroelectrodes
[AD-A171272] N87-15427
Modification of microelectrode arrays: New microelectrochemical devices for sensor applications
[AD-A171180] N87-15454
OXIDIZERS
Low heat transfer oxidizer heat exchanger design and analysis
[NASA-CR-179488] N87-15272
OXYGEN
COCHISE atmospheric nitrogen/oxygen excitation studies
[AD-A172234] N87-15667
OXYGEN SPECTRA
Investigation on the intensity progression of F-region nightglow emission of the oxygen red line by means of atmospheric gravity waves soliton N87-15816
OZONE
Control of H2S emissions using an ozone oxidation process: Preliminary results
[NASA-TM-88475] N87-15525
COCHISE atmospheric nitrogen/oxygen excitation studies
[AD-A172234] N87-15667

P

PACKET TRANSMISSION
APC: A concept demonstration of end-to-end packetized data transportation techniques N87-15247
Methods of multiple access communications with energy detectors
[AD-A172757] N87-15409
PADE APPROXIMATION
Nonlinear partial differential equations and related problems of pade approximations
[AD-A172253] N87-15748
PAIR PRODUCTION
Bound electron-positron pair creation by gamma-quanta in superstrong magnetic field of pulsars N87-15848
PALLADIUM
Study of the kinetics of catalytic decomposition of hydrazine vapors on palladium
[NASA-TM-88549] N87-15286
PANELS
Rivited panel surface measurement using photogrammetry N87-15351
PARALLEL PROCESSING (COMPUTERS)
Systolic VLSI for Kalman filters N87-15360
A communication bandwidth model for shuffle-exchange and augmented shuffle-exchange interprocessor communication networks
[AD-A171287] N87-15402
Nonsequential computation and laws of nature
[AD-A171505] N87-15731
Randomized routing on fat trees
[AD-A171546] N87-15738
Optical processing
[AD-A172362] N87-15791
PARALLEL PROGRAMMING
A programming environment for parallel vision algorithms
[AD-A171561] N87-15739
PARAMETER IDENTIFICATION
Identification of damping parameters of a squeeze-film bearing
[AD-A169678] N87-15470
The initialization and use of prognostic land-surface values in the French operational forecast system — weather forecasting N87-15553
Sonic anemometer surface heat flux measurements for validation of satellite observations N87-15599
An integrated system to assess agricultural productivity — satellite imagery N87-15621
Design of a data base system for inferring land surface parameters and fluxes from satellite radiances N87-15625
Adaptive modeling of the dynamics of autonomous land vehicles
[AD-A172404] N87-15911
PARAMETERIZATION
Identification of damping parameters of a squeeze-film bearing
[AD-A169678] N87-15470
Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference
[ESA-SP-248] N87-15544
WCRP (World Climate Research Program) on Land Surface Processes and Climate: Objectives and requirements N87-15546
The atmospheric boundary layer and its parameterization N87-15548

Boundary layer parameterizations and land surface processes in GFDL GCMS — Geophysical Fluid Dynamics Laboratory General Circulation Models (GFDL CGMs) N87-15549

Evolving ideas on the boundary layer concerning regional evaporation N87-15550

Land-surface parameterization in the Japan Meteorological Agency (JMA) operational spectral model N87-15551

Treatment of land-surface properties in the ECMWF model — European Center for Medium Range Weather Forecasts (ECMWF) N87-15552

Issues concerning the evaluation of effective surface roughness of heterogeneous terrain N87-15556

Parameterization of albedo, thermal inertia, and surface roughness of desert scrub/sandy soil surface N87-15557

A brief description of the simple biosphere model (SiB) N87-15558

Parameterization of glacierization for a climate model N87-15560

GCM sensitivity studies: Implications for parameterizations of land processes — General Circulation Models (GCM) N87-15561

Zero-D sensitivity studies with the NCAR CCM land surface parameterization scheme — Community Climate Model (CCM) N87-15562

The sensitivity of the UK Meteorological Office atmospheric general circulation model to recent changes to the parameterization of hydrology N87-15564

Preliminary results of anthropogenic albedo changes over the past 15 years in Eastern Canada N87-15617

Hydrological atmospheric pilot experiment (HAPEX) 86 N87-15627

Automatic parameterization and analysis of stellar atmospheres: A study of the DA white dwarfs N87-15918

PARTIAL DIFFERENTIAL EQUATIONS

An 1 sup (p) theory for the n-dimensional, stationary, compressible, Navier-Stokes equations, and the incompressible limit for compressible fluids. The equilibrium solutions
[AD-A172778] N87-15451

PARTIAL PRESSURE

A radiative transfer study of the early terrestrial atmospheres N87-15664

A new approach to non-invasive oxygenated mixed venous PCO(sub)2
[NASA-CR-171949] N87-15682

PARTICLE ACCELERATION

Explosive coalescence of current loops and particle acceleration N87-15804

Preflare acceleration by magnetic trapping in shearing arcades — solar flares N87-15811

Magnetic reconnection, generation of plasma fluxes and accelerated particles in laboratory experiments and space plasma N87-15821

Magnetic boundary and acceleration of charged particles in spatially nonuniform configurations — space plasmas N87-15822

Radiative-resonant acceleration by plasma turbulence — cosmic plasma N87-15826

Resonant ion acceleration by magnetosonic shock waves N87-15827

Monte Carlo simulation of particle acceleration by shock waves — cosmic plasma N87-15830

Problems of cosmic ray acceleration in giant molecular clouds N87-15834

Injection mechanism for the cosmic ray acceleration by shocks N87-15835

Radiative acceleration of clouds near compact accreting objects — active galactic nuclei N87-15843

PARTICLE ACCELERATOR TARGETS

Calculations of heat deposition in a target system bombarded by high energy charged particles
[DE86-700263] N87-15784

PARTICLE INTERACTIONS

Investigations of the interactions of radiation with matter
[AD-A171232] N87-15779

Collective interactions of neutrinos with dense astrophysical plasmas N87-15837

PARTICLE LADEN JETS

Study of particulated flows and erosion in turbomachinery
[AD-A172965] N87-15232

PARTICLE MOTION

Kinetic equation for Hamiltonian systems integrable in the mean field approximation — globular star clusters N87-15795

Stochastization of charged particle motion near a magnetic field reversal and the problem of explosive reconnection — magnetotail N87-15823

PARTICLE SIZE DISTRIBUTION

Propagation through Martian dust at 8.5 and 32 GHz N87-15359

Effects of atmospheric aerosol size distributions on the retrieval of surface spectral radiance from satellite N87-15596

PARTICLES

Study of particulated flows and erosion in turbomachinery
[AD-A172965] N87-15232

Statistical mechanics of one-dimensional systems. 4: Generalization of the hard-core repulsion in multicomponent gases N87-15755

PASSIVITY

Selective hydrogen passivation of oxygen-related thermal-donor clusters in silicon
[DE86-014718] N87-15894

PATENT POLICY

H.R. 4316 and H.R. 3112: Inventions in outer space
[GPO-64-526] N87-15905

PAVEMENTS

Facilities technology application tests: Fuel-resistant pavement sealers
[AD-A171473] N87-15238

PAYLOAD CONTROL

APC: A concept demonstration of end-to-end packetized data transportation techniques N87-15247

PERCEPTION

Minimum points and views for the recovery of 3-dimensional structure
[AD-A171148] N87-15696

Human real time perception in noise
[AD-A172374] N87-15899

PERFORMANCE PREDICTION

Boundary layer control by transition fixing
[ESA-TT-909] N87-15160

Received optical power calculations for optical communications link performance analysis N87-15333

A cost-performance model for ground-based optical communications receiving telescopes N87-15336

Predicting antenna sidelobe performance
[AD-A172708] N87-15408

PERFORMANCE TESTS

Air traffic control radar beacon system transponder performance study and analysis. Vol. 1: Transponder test methodology results, analysis and recommendations
[DOT/FAA/FS-86/1.1-VOL-1] N87-15198

High performance crystal oscillator development
[AD-A172831] N87-15433

Experimental evaluation of the ring focus test for X-ray telescopes using AXAF's technology mirror assembly, MSFC CDDF Project No. H20
[NASA-TM-86570] N87-15916

PERIODIC VARIATIONS

Indications of the sensitivity of European climate to land use variations using a one-dimensional model N87-15566

Investigation of subpulse drift in pulsars meaning the Coriolis force and inhomogeneities N87-15851

PERMEABILITY

Aging of polyurethane foams, the influence of gas diffusion on thermal conductivity
[DE86-014339] N87-15314

PERSONNEL

Noise susceptibility: A comparison of two Naval aviator populations
[AD-A172222] N87-15693

PERSONNEL MANAGEMENT

NASA: The vision and the reality
[OP-5] N87-15898

PERSONNEL SELECTION

G-tolerance standards for aircrew training and selection
[AD-A170441] N87-15685

PERTURBATION

An experimental investigation of wall pressure fluctuations beneath non-equilibrium turbulent flows
[AD-A171508] N87-15449

PERTURBATION THEORY

Transonic controversy and regular perturbation methods for subcritical flows N87-15172

Interatomic interactions in solids: An effective medium approach
[AD-A171518] N87-15867

PETROLOGY

Meteoritic basalts: The nakhlites, their parental magmas, cooling rates, and equivalents on Earth
[NASA-CR-180071] N87-15922

PHASE LOCKED SYSTEMS

A comparison of methods for DPLL loop filter design N87-15342

Research program on a compact and high-power microwave tube
[AD-A171567] N87-15430

PHASE MATCHING

Harmonic conversion of GEKKO 12 high-power Nd:glass laser N87-15767

PHASE MODULATION

Land mobile satellite communications: Channel model, modulation, and error control N87-15370

PHASE SHIFT

Ground plane interference elimination by passive element
[NASA-CASE-NPO-18632-1-CU] N87-15390

PHASE TRANSFORMATIONS

The barium iron ruthenium oxide system
[NASA-TM-88451] N87-15284

Chalcogenide glasses. Part 4: Crystallization and glass transition characteristics in AS(2-x)Sb(x)S(3) glass-forming system
[AD-A171564] N87-15310

PHASED ARRAYS

Ground plane interference elimination by passive element
[NASA-CASE-NPO-18632-1-CU] N87-15390

Degradation in performance of adaptive null-steering antennas
[AD-A169663] N87-15396

Predicting antenna sidelobe performance
[AD-A172708] N87-15408

PHONONS

Laser-linewidth effects on the photon-phonon conversion rate at a gas-solid interfaces
[AD-A171469] N87-15886

Study of transient phonon dynamics
[AD-A172691] N87-15892

PHOSPHIDES

Preparation and characterization of several 2-4-V2 stannite single crystals
[AD-A172238] N87-15890

PHOSPHORIC ACID

Effects of phosphoric acid on the lead-acid battery reactions N87-15772

PHOTOCHEMICAL REACTIONS

Photochemical ignition studies. Part 2: Oxygen-atom 2-photon resonance effects
[AD-A172974] N87-15463

PHOTOCONDUCTIVITY

Effect of light-soaking on electronic properties of glow-discharged hydrogenated amorphous silicon N87-15763

Electrical conductivity and carrier mobility in polyphenylacetylene and polychlorophenylacetylene and their doping effect N87-15764

Photoinduced effects in polythiophene film N87-15765

PHOTODECOMPOSITION

Vacuum ultraviolet photochemistry
[DE86-015768] N87-15282

PHOTODIODES

A cooled avalanche photodiode with high photon detection probability N87-15334

PHOTOGEOLOGY

Geological-morphological description of the Lakshmi planum (photomap of the Venusian surface sheet B-4)
[NASA-TM-88495] N87-15926

PHOTOGRAMMETRY

Rivited panel surface measurement using photogrammetry N87-15351

PHOTOIONIZATION

Vacuum ultraviolet photochemistry
[DE86-015768] N87-15282

Investigations of the interactions of radiation with matter
[AD-A171232] N87-15779

PHOTOLUMINESCENCE

Transmission electron microscope and photoluminescence studies of ZnS crystalline films grown by low-pressure MOCVD N87-15766

PHOTOLYSIS

OH measurement by laser light absorption N87-15531

PHOTOMAPPING

Automatic geometric correction after scanning — road mapping N87-15508

PHOTOMAPS

Geological-morphological description of the Lakshmi planum (photomap of the Venusian surface sheet B-4)
[NASA-TM-88495] N87-15926

PHOTOMETRY

Main sequence photometry of globular clusters N87-15920

PHOTON BEAMS

A cooled avalanche photodiode with high photon detection probability N87-15334

PHOTON DENSITY

Two-photon laser-induced fluorescence detection of OH N87-15533

PHOTONS

Photochemical ignition studies. Part 2: Oxygen-atom 2-photon resonance effects
[AD-A172974] N87-15463

PHOTONUCLEAR REACTIONS
Two-photon annihilation radiation in strong magnetic field — pulsars N87-15847
PHOTOVOLTAIC CELLS
Electrical power system design for the US space station
[NASA-TM-88824] N87-15267
Current- and lattice-matched tandem solar cell
[DE86-013757] N87-15521
PHYSIOLOGICAL EFFECTS
Bedrest in healthy women: Effects of menstrual function and oral contraceptives
[NASA-CR-171946] N87-15681
Exploratory study of the potential effects of exposure to sonic boom on human health. Volume 2: Epidemiological study
[AD-A170953] N87-15686
PIEZOELECTRIC CERAMICS
Ferroic shape memory materials and Piezo:Pyro-Electric oriented recrystallized glasses
[AD-A171409] N87-15309
PIEZOELECTRIC TRANSDUCERS
Development of instrumentation to measure sound speed and flow direction in dusty flow fields
[AD-A171050] N87-15453
PILOT PERFORMANCE
On the pilot's behavior of detecting a system parameter change
[NASA-TM-88479] N87-15695
PIPE FLOW
Critical flows — liquids N87-15325
PISTONS
Composite piston
[NASA-CASE-LAR-13435-1] N87-15464
PLANAR STRUCTURES
Integrated optic modules for multichannel deflection/switching and signal processing
[AD-A171178] N87-15789
PLANETARY ATMOSPHERES
A radiative transfer study of the early terrestrial atmospheres N87-15864
PLANETARY BOUNDARY LAYER
Boundary layer parameterizations and land surface processes in GFDL GCMS — Geophysical Fluid Dynamics Laboratory General Circulation Models (GFDL CGMs
N87-15549
PLANETARY MAGNETIC FIELDS
Spontaneous reconnection at the boundaries of planetary magnetospheres N87-15815
Magnetospheric tails in the solar planetary system
N87-15818
On the effect of differential rotation on axisymmetric and nonaxisymmetric magnetic fields of cosmic bodies
N87-15876
PLANETARY NEBULAE
The transformation from planetary nebula nucleus to white dwarf: A seismological study of stellar metamorphosis N87-15919
PLANETARY SURFACES
Unstable deformation in layered media: Application to planetary lithospheres N87-15925
PLANETARY WAVES
Drift vortices in plasma modelled on fast-rotating shallow field N87-15862
PLASMA ARC WELDING
Fatigue crack propagation and fracture toughness of plasma arc welded Ti-6Al-4V alloy
[RAE-TR-85066] N87-15478
PLASMA CLOUDS
Time dependent behavior of interstellar maser features due to stimulated scattering through dense plasma clouds N87-15838
Radiative acceleration of clouds near compact accreting objects — active galactic nuclei N87-15843
PLASMA CURRENTS
Generation of plasma flows by oscillations of magnetic flux tubes N87-15803
Explosive coalescence of current loops and particle acceleration N87-15804
PLASMA DENSITY
Intense excitation source of blue-green laser
[AD-A172660] N87-15460
Radiation of ion-acoustic waves by supersonic soliton
N87-15868
PLASMA DIAGNOSTICS
Laboratory simulation of collisionless coupling between supernova remnants and magnetized interstellar medium
N87-15798
PLASMA DRIFT
Drift vortices in plasma modelled on fast-rotating shallow field N87-15862
Revision of the theory of gradient solitons — plasma drift N87-15865
PLASMA DYNAMICS
Influence of reflected ions on the front structure of quasi-perpendicular collisionless shock waves
N87-15829
The role of cosmic rays in supernovae shock dynamics N87-15832
Relativistic self-focusing of powerful electromagnetic radiation in plasma N87-15858
Electron nonlinearities and rapid wave processes in cosmic and laboratory plasmas N87-15859
Negative energy vortices in inhomogeneous plasma
N87-15863
PLASMA EQUILIBRIUM
Deviation from local thermodynamic equilibrium in a cesium-seeded argon plasma
[EUT-85-E-152] N87-15881
PLASMA FLUX MEASUREMENT
Magnetic reconnection, generation of plasma fluxes and accelerated particles in laboratory experiments and space plasma N87-15821
PLASMA FOCUS
Intense excitation source of blue-green laser
[AD-A172660] N87-15460
Relativistic self-focusing of powerful electromagnetic radiation in plasma N87-15858
PLASMA FREQUENCIES
Space applications of basic plasma theory
N87-15248
On low-hybrid turbulence excited by ion streams — plasma turbulence N87-15860
PLASMA HEATING
Energy dissipation and convective motors in the local MHD-resonance regions in solar chromosphere
N87-15806
Magnetic energy dissipation in a rarefied plasma by the relaxation process — solar corona N87-15824
Resonant ion acceleration by magnetosonic shock waves N87-15827
Very hot interstellar matter heated by a galactic shock wave N87-15826
PLASMA INTERACTIONS
Mass loading and MHD turbulence in the solar wind/comet interaction region N87-15836
Nonlinear conversion emission mechanisms in the open plasma systems in astrophysics N87-15840
PLASMA JETS
Radiative acceleration of clouds near compact accreting objects — active galactic nuclei N87-15843
PLASMA OSCILLATIONS
Vortices in magnetized plasmas N87-15802
Oscillations and waves in sunspots N87-15805
PLASMA PHYSICS
Space applications of basic plasma theory
N87-15248
Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics — conference
[ESA-SP-251] N87-15793
Relativistic plasmas in active galactic nuclei
N87-15794
PLASMA PINCH
Intense excitation source of blue-green laser
[AD-A172660] N87-15460
PLASMA RADIATION
X-ray spectroscopy with Z-pinch neon plasmas
[AD-A172228] N87-15879
PLASMA RESONANCE
Energy dissipation and convective motors in the local MHD-resonance regions in solar chromosphere
N87-15806
Radiative-resonant acceleration by plasma turbulence — cosmic plasma N87-15826
Microwave pulse compression in dispersive plasmas
[AD-D012426] N87-15877
PLASMA TEMPERATURE
The application of laser saturation to the efficient generation of short wavelength radiation from plasmas
[AD-A172945] N87-15462
PLASMA TURBULENCE
Radiative-resonant acceleration by plasma turbulence — cosmic plasma N87-15826
Distortions of power-law of electrons in turbulent plasma reactor — decametric cosmic rays N87-15841
On low-hybrid turbulence excited by ion streams — plasma turbulence N87-15860
The nonlinear turbulent dynamo in the accretion disks of black holes N87-15869
PLASMA WAVES
Space applications of basic plasma theory
N87-15248
Oscillations and waves in sunspots N87-15805
Resonant ion acceleration by magnetosonic shock waves N87-15827
Influence of reflected ions on the front structure of quasi-perpendicular collisionless shock waves
N87-15829
Monte Carlo simulation of particle acceleration by shock waves — cosmic plasma N87-15830
The role of cosmic rays in supernovae shock dynamics N87-15832
Nonlinear conversion emission mechanisms in the open plasma systems in astrophysics N87-15840
PLASMA-ELECTROMAGNETIC INTERACTION
The interaction of rotating magnetized stars with accreting plasma N87-15797
Magnetospheric tails in the solar planetary system
N87-15818
Radiation transfer and radiation pressure on plasma by magnetic degenerates — stellar radiation N87-15845
Relativistic self-focusing of powerful electromagnetic radiation in plasma N87-15858
On low-hybrid turbulence excited by ion streams — plasma turbulence N87-15860
PLASMAGUIDES
Microwave pulse compression in dispersive plasmas
[AD-D012426] N87-15877
PLASMAS (PHYSICS)
Automation of preparation of nonmetallic samples for analysis by atomic absorption and inductively coupled plasma spectrometry
[NASA-TM-88476] N87-15285
The application of laser saturation to the efficient generation of short wavelength radiation from plasmas
[AD-A172945] N87-15462
Auroral electron acceleration by lower-hybrid waves
[DE86-703346] N87-15658
Microwave pulse compression in dispersive plasmas
[AD-D012426] N87-15877
X-ray spectroscopy with Z-pinch neon plasmas
[AD-A172228] N87-15879
Plasma outflow and superrotation in the Jovian magnetosphere deduced from Voyager observations
N87-15924
PLASMASPHERE
Sporadic narrowband radio emissions from Uranus
[AD-A170947] N87-15928
PLASTIC DEFORMATION
Shear localization in rate and temperature dependent solids N87-15477
Experimental investigations with notched samples of elastic-plastic materials behavior
[W-2/84] N87-15496
PLATEAUS
Geological-morphological description of the Lakshmi planum (photomap of the Venusian surface sheet B-4)
[NASA-TM-88495] N87-15926
PLATES (TECTONICS)
Crustal deformation in great California earthquake cycles
[NASA-CR-180059] N87-15655
Unstable deformation in layered media: Application to planetary lithospheres N87-15925
PNEUMATIC EQUIPMENT
Formulation and minimality of nonlinear discrete time control systems N87-15233
POINTING CONTROL SYSTEMS
Pointing calibration of the MKIVA DSN antennas Voyager 2 Uranus encounter operations support N87-15352
POISSON DENSITY FUNCTIONS
Methods of multiple access communications with energy detectors
[AD-A172757] N87-15409
POISSON EQUATION
Feasibility and comparison investigation of the use of the Fast Fourier Transform and finite difference method for numerical solution of boundary value problems
[AD-A172719] N87-15749
POLAR REGIONS
Climatic effect of snowfall anomaly in mid-high latitudes in a one-dimensional air-land model N87-15567
POLAR WANDERING (GEOLOGY)
Earth rotation polar motion and climatology
N87-15601
POLARIZATION (WAVES)
Harmonic conversion of GEKKO 12 high-power Nd:glass laser N87-15787
POLITICS
NASA: The vision and the reality
[OP-5] N87-15898
POLLUTION CONTROL
Automotive Spark-Ignition Engine in a New European Context. Proceedings
[DE86-753253] N87-15468
POLYACETYLENE
Electrical conductivity and carrier mobility in polyphenylacetylene and polychlorophenylacetylene and their doping effect N87-15764
POLYAMIDE RESINS
Mechanical properties versus morphology of ordered polymers, volume 6
[AD-A171221] N87-15307

Condensation polymers with controlled structure
[AD-A172283] N87-15311
POLYATOMIC MOLECULES
Vacuum ultraviolet photochemistry
[DE86-015768] N87-15282
POLYCRYSTALS
PH sensitive WO3-Based microelectrochemical transistors
[AD-A172563] N87-15432
Laser-induced chemical vapor deposition of germanium and doped-germanium films
[AD-D012462] N87-15888
POLYIMIDE RESINS
Process for curing bismaleimide resins
[NASA-CASE-ARC-11429-4] N87-15304
POLYMERIC FILMS
Mechanical properties versus morphology of ordered polymers, volume 6
[AD-A171221] N87-15307
POLYMERIZATION
Condensation polymers with controlled structure
[AD-A172283] N87-15311
Photoinduced effects in polythiophene film N87-15765
POLYNOMIALS
Diagonalization methods in a polynomial setting
[FVI-86-10] N87-15750
POLYPHENYLS
Condensation polymers with controlled structure
[AD-A172283] N87-15311
POLYURETHANE FOAM
Aging of polyurethane foams, the influence of gas diffusion on thermal conductivity
[DE86-014339] N87-15314
POROUS MATERIALS
Research in nonlinear acoustics
[AD-A172634] N87-15777
POSITION (LOCATION)
Location finding using meteorological satellite images N87-15600
POSITRONIUM
Bound electron-positron pair creation by gamma-quanta in superstrong magnetic field of pulsars N87-15848
Gamma-positronium in the magnetosphere of a pulsar N87-15852
POTENTIAL ENERGY
The five deepest potential hypersurfaces of the CH2(+) ion. Description by continuous functions adapted to initial values
[MPIS-4/1986] N87-15781
POWDER METALLURGY
Metallurgical variables influencing the corrosion susceptibility of P/M (Powder Metallurgy) 7091 Aluminum/SiCw composite
[AD-A170946] N87-15294
Ultrasonic backscatter and attenuation measurements for microstructure characterization: Application to consolidated rapidly solidified type 304 stainless steel powder
[DE86-014917] N87-15300
POWER FACTOR CONTROLLERS
Application of superconducting magnet energy storage to power system stabilizing control N87-15762
POWER SPECTRA
Received optical power calculations for optical communications link performance analysis N87-15333
Investigation of the UHF mobile-radio propagation channel in a temperate-zone forested environment
[AD-A171431] N87-15403
PRECISION
Pointing calibration of the MKIVA DSN antennas Voyager 2 Uranus encounter operations support N87-15352
PRECONDITIONING
Iterative methods and preconditioning for solving large system of linear equations N87-15756
PREDICTION ANALYSIS TECHNIQUES
An interdisciplinary approach to predictive modeling of structural adhesive bonding. Characterization of Ti-6Al-4V oxides and the adhesive/oxide interphase
[AD-A172313] N87-15312
Overview of major hazards. Part 2: Source term; dispersion; combustion; blast, missiles, venting; fire; radiation; runaway reactions; toxic substances; dust explosions N87-15323
Computational fluid dynamic studies of certain ducted bluff-body flowfields relevant to turbojet combustors. Volume 2: Time-averaged flowfield predictions for a proposed centerbody combustor
[AD-A171169] N87-15447
Creep fatigue life prediction for engine hot section materials (ISOTROPIC)
[NASA-CR-179550] N87-15491
Verification of mesoscale objective analyses of VAS and rawinsonde data using the March 1982 AVE/VAS special network data
[NASA-CR-179988] N87-15670
PREDICTIONS
A model for predicting thermomechanical response of large space structures
[AD-A172966] N87-15264
The detailed mathematical prediction of simultaneous heat and mass transfer in cavities N87-15440
The angular sizes of faint radio sources and their implications for cosmology N87-15930
PREPARATION
Automation of preparation of nonmetallic samples for analysis by atomic absorption and inductively coupled plasma spectrometry
[NASA-TM-88476] N87-15285
PREPREGS
The use of microdielectrometry in monitoring the cure of carbon-epoxy prepreg
[AD-A172304] N87-15280
PREPROCESSING
On the need to benchmark simulation codes — boundary layer flow N87-15214
PRESSURE CHAMBERS
Weightlessness simulation system and process
[NASA-CASE-ARC-11648-1] N87-15253
PRESSURE DISTRIBUTION
The influence of transition strips on the pressure distribution on transonic profiles N87-15166
PRESSURE MEASUREMENT
Transition detection using surface pressure holes N87-15170
PRESSURE VESSELS
Corrosion and stress corrosion of steel pressure boundary components and steam turbines
[DE86-780555] N87-15293
Experimental program — residual life N87-15482
Experimental investigations with notched samples of elastic-plastic materials behavior
[W-2/84] N87-15496
Statistical mechanics of one-dimensional systems. 4: Generalization of the hard-core repulsion in multicomponent gases N87-15755
PRINTED CIRCUITS
Printed circuit card hybrid
[AD-D012448] N87-15428
PROBABILITY DENSITY FUNCTIONS
Large deviation local limit theorems for random vectors
[AD-A171176] N87-15746
The characteristics of the second-order target model
[RAE-TR-85071] N87-15752
PROBLEM SOLVING
Efficient solutions to the Euler equations for supersonic flow with embedded subsonic regions
[NASA-TP-2523] N87-15183
Conservative boundary conditions for 3D gas dynamics problems
[NASA-TM-88487] N87-15444
Approaches to optimization/simulation problems
[DE86-012758] N87-15736
PROCUREMENT MANAGEMENT
Air traffic control: FAA's (Federal Aviation Administration's) advanced automation system acquisition strategy is risky
[PB86-231743] N87-15200
PROCUREMENT POLICY
Air traffic control: FAA's (Federal Aviation Administration's) advanced automation system acquisition strategy is risky
[PB86-231743] N87-15200
PRODUCT DEVELOPMENT
MSAT system and service description — mobile communications N87-15387
PROGRAM VERIFICATION (COMPUTERS)
Handbook. Volume 1: Validation of digital systems in avionics and flight control applications
[DOT/FAA/CT-82/115-VOL-1-REV] N87-15204
On the need to benchmark simulation codes — boundary layer flow N87-15214
PROGRAMMING LANGUAGES
Generation of Interactive Programming Environments (GIPE)
[CWI-CS-R8620] N87-15707
Generation of Interactive Programming Environments (GIPE). Outline of the GIPE project N87-15708
Proposal for a language definition formalism and selection of test cases. Deliverable D4 of task T4 - second review — programming language N87-15716
User definable syntax for specification languages. Annexe D4.A1 of deliverable D4 — programming languages N87-15717
Specifications in natural semantics. Deliverable D4 of task T4, annex 2 — programming languages N87-15718
Proposal for an algebraic semantics definition formalism. Annexe D4.A3 of deliverable D4 - second review — programming languages
[CWI-CS-R8504] N87-15719
Global outline of an environment generation system. Deliverable D5 of task T5 - second review — computer programming N87-15720
PROJECT MANAGEMENT
Institutional aspects: INMARSAT — land mobile satellite service N87-15384
Activities of the European Conference of Posts and Telecommunications (CEPT) special Group on Mobile Communications (GSM) N87-15385
Planning and control of map production and reproduction using computers N87-15505
Future European plans in the framework of the International Satellite Land Surface Climatology Project (ISLSCP) N87-15628
NASA: The vision and the reality
[OP-5] N87-15898
PROJECT SETI
The Telecommunications and Data Acquisition Report
[NASA-CR-179938] N87-15329
PROJECTILES
Drag predictions for projectiles at transonic and supersonic speeds
[AD-A171462] N87-15191
Assessment of two fast codes used for preliminary aerodynamic design of guided projectiles
[AD-A171276] N87-15255
Supersonic flow over cylindrical afterbodies with base bleed
[AD-A171461] N87-15448
PROJECTORS
Large TV display system
[NASA-CASE-NPO-16932-1] N87-15413
PROPELLANT TESTS
Surveillance report. Stage 1: Dissected Motor/Propellant Motor Number 0012029
[AD-A171132] N87-15274
PROPELLERS
Cloud cavitation and collective bubble dynamics
[AD-A170892] N87-15446
PROPULSION SYSTEM CONFIGURATIONS
Thermodynamic and Flow Mechanical Problems in Aircraft and Spacecraft Drives. Summary of conference reports for 1974, 1975, 1976
[ETN-87-98750] N87-15223
PROPULSION SYSTEM PERFORMANCE
Comparison of turboengine, turborocket, and turbojet engine as propulsion for long range and high Mach numbers N87-15225
Air breathing jet engines for satellite launcher vehicles. Analysis and comparison of suitable propulsion concepts N87-15226
Integrated turboramjet-rocket performance potential: Project ITUSTRA — hybrid propulsion systems
[ICAS-DGLR-76-045] N87-15227
PROTOCOL (COMPUTERS)
Definition of common interfaces. Deliverable D2 of task T2 — computer programming environments N87-15712
PROTONS
The two state structure of the solar wind and its influence upon proton temperatures in the inner heliosphere. Observations of Helios 1 and Helios 2 N87-15929
PROTOTYPES
Implementation of a land mobile terminal for satellite data communication N87-15374
PSYCHOLOGICAL FACTORS
Novice rules for assessing importance in scientific texts
[AD-A171551] N87-15698
PSYCHOLOGY
Minimum points and views for the recovery of 3-dimensional structure
[AD-A171148] N87-15696
PSYCHOMOTOR PERFORMANCE
On the pilot's behavior of detecting a system parameter change
[NASA-TM-88479] N87-15695
PSYCHOPHYSICS
The effect of long term monocular occlusion on vernier threshold: Elasticity in the young adult visual system
[AD-A171289] N87-15688
Minimum points and views for the recovery of 3-dimensional structure
[AD-A171148] N87-15696
PUBLIC HEALTH
Exploratory study of the potential effects of exposure to sonic boom on human health. Volume 2: Epidemiological study
[AD-A170953] N87-15686
PUBLIC LAW
H.R. 4932: To amend land remote sensing commercialization
[GPO-64-491] N87-15515
PULSARS
Physics of pulsar magnetosphere N87-15844
Two-photon annihilation radiation in strong magnetic field — pulsars N87-15847

Bound electron-positron pair creation by gamma-quanta in superstrong magnetic field of pulsars N87-15848
The generation of radio waves in the inhomogeneous magnetic field of the pulsar magnetosphere N87-15849
Electrodynamics of inhomogeneous relativistic electron-positron plasma and radio emission of pulsars N87-15850
Investigation of subpulse drift in pulsars meaning the Coriolis force and inhomogeneities N87-15851
Gamma-positronium in the magnetosphere of a pulsar N87-15852
Output energy in pulsars N87-15853
Wisps in the Crab Nebula N87-15854
Pulsar electrodynamics: Magnetospheres and radiation by magnetospheric plasma N87-15855
Pairs of pulsars in the diagram P dot versus P N87-15856
Accreting pulsars: Some recent theoretical results N87-15857

PULSE COMMUNICATION
A land mobile satellite for digital communications in Europe N87-15388

PULSE COMPRESSION
Microwave pulse compression in dispersive plasmas [AD-D012426] N87-15877

PULSE POSITION MODULATION
A synchronization technique for optical PPM signals N87-15332

PULSED LASERS
Aircraft collision warning system [AD-D012463] N87-15199

PULSES
Signal-to-noise ratio requirements for detection of multiple pulses subject to partially correlated fading with chi-squared statistics of various degrees of freedom [AD-A172223] N87-15405

PULTRUSION
Comparison of flexural properties of aramid-reinforced pultrusions having varied matrices, pretreatments and post-cures [NASA-TM-88997] N87-15277

PYRITES
Preparation and characterization of several 2-4-V2 stannite single crystals [AD-A172238] N87-15890

PYROELECTRICITY
Ferroic shape memory materials and Piezo:Pyro-Electric oriented recrystallized glasses [AD-A171409] N87-15309

Q

QUADRUPOLES
Quadrupole ion/neutral mass spectrometer for space shuttle applications: Environmental research papers [AD-A172275] N87-15265

QUALITY CONTROL
Quality assurance methods manual for experimental design and data management [DE86-015180] N87-15473
Replicas and structural analysis: Criteria for the reliability of creep-loaded installations N87-15484

QUANTITATIVE ANALYSIS
Durability of structural adhesively bonded systems [AD-A170708] N87-15492

QUANTUM ELECTRONICS
Josephson effect detectors of microwave and far infrared radiation [AD-A171539] N87-15889

QUANTUM MECHANICS
Quantum effects in synchronization radiation of a plasma in superstrong magnetic fields of neutron stars N87-15846
Bound electron-positron pair creation by gamma-quanta in superstrong magnetic field of pulsars N87-15848
Spontaneous compactification of extra dimensions in eleven-dimensional quantum gravity [DE86-702620] N87-15895

QUANTUM THEORY
Nonlinear partial differential equations and related problems of pade approximations [AD-A172253] N87-15748
Inelastic gas-surface scattering. Part 2: Results [AD-A171587] N87-15780

QUASARS
Relativistic plasmas in active galactic nuclei N87-15794
Blazars: Beamed or not beamed --- quasars, BL Lac objects N87-15801
EX56a study of extended X-ray emission around isolated galaxies EX56b identification and spectra of bright X-ray sources at high galactic latitude [NASA-CR-180099] N87-15931

QUERY LANGUAGES
Theory of non-first Norman form relational databases [AD-A171285] N87-15729

QUEUEING THEORY
The effectiveness of Jackson networks as control variates for queueing network simulation [AD-A171280] N87-15728
The power of the queue [AD-A171536] N87-15732

R

RADAR ANTENNAS
Degradation in performance of adaptive null-steering antennas [AD-A169663] N87-15396

RADAR BEACONS
Air traffic control radar beacon system transponder performance study and analysis. Vol. 1: Transponder test methodology results, analysis and recommendations [DOT/FAA/FS-86/1.1-VOL-1] N87-15198

RADAR BEAMS
Model of a shaped-beam emission pattern of a satellite antenna for interference analysis [PB86-238755] N87-15410

RADAR EQUIPMENT
Noises of klystron oscillators of a small power [AD-A170220] N87-15418

RADAR TRACKING
Development of Ku-band rendezvous radar tracking and acquisition simulation programs [NASA-CR-171950] N87-15392

RADIAL VELOCITY
ICE Second Halley radial: TDA mission support and DSN operations N87-15358

RADIANCE
Effects of atmospheric aerosol size distributions on the retrieval of surface spectral radiance from satellite N87-15596
Design of a data base system for inferring land surface parameters and fluxes from satellite radiances N87-15625
An approach to derive the radiation budget over the Sahara N87-15641

RADIANT FLUX DENSITY
Clear land anisotropy conversion factors: A comparison of theoretical and experimental results --- Earth atmosphere N87-15581
Short wave radiative fluxes at surface from NOAA satellites N87-15638

RADIANT HEATING
Thermal vacuum heater array apparatus [AD-D012436] N87-15420

RADIATION ABSORPTION
Laser-linewidth effects on the photon-phonon conversion rate at a gas-solid interfaces [AD-A171469] N87-15886

RADIATION COUNTERS
A cooled avalanche photodiode with high photon detection probability N87-15334

RADIATION DAMAGE
Investigations of the interactions of radiation with matter [AD-A171232] N87-15779

RADIATION DETECTORS
SLAC pulsed X-ray facility [DE86-012045] N87-15456

RADIATION EFFECTS
Investigations of the interactions of radiation with matter [AD-A171232] N87-15779
Josephson effect detectors of microwave and far infrared radiation [AD-A171539] N87-15889

RADIATION HAZARDS
Two Phase Flows in Major Technological Hazards, volume 1 --- conference [VKI-LS-1986-03-VOL-1] N87-15321

RADIATION INJURIES
SLAC pulsed X-ray facility [DE86-012045] N87-15456

RADIATION MEASUREMENT
Comparison of measured and modeled radiation, heat and water vapor fluxes: FIFE pilot study [NASA-CR-179989] N87-15516
Downward longwave radiation at the surface in clear-sky atmospheres: Comparisons of measured, satellite-derived, and calculated fluxes N87-15578
On the influence of surface characteristics from satellite radiation measurements N87-15580
An approach to derive the radiation budget over the Sahara N87-15641
Measurements and estimations of the energy balance and surface temperature of the Dischma Valley (Switzerland) N87-15650
Measuring and modeling solar irradiance on vertical surfaces [DE86-010737] N87-15668

RADIATION PRESSURE
Radiation transfer and radiation pressure on plasma by magnetic degenerates --- stellar radiation N87-15845

RADIATION SHIELDING
An assessment of transport coefficient approximations used in galactic heavy ion shielding calculations [NASA-TM-89054] N87-15782

RADIATION TOLERANCE
Radiation resistance of thin antennas of arbitrary elevation and configuration over perfectly conducting ground [AD-A170945] N87-15397

RADIATION TRANSPORT
Influence of multiple cloud layers on planetary albedo N87-15635

RADIATIVE TRANSFER
Estimation of vegetation cover at subpixel resolution using LANDSAT data [NASA-CR-177077] N87-15514
On the influence of surface characteristics from satellite radiation measurements N87-15580
Determination of the longwave surface net flux from radiances to space N87-15648
A radiative transfer study of the early terrestrial atmospheres N87-15664
Radiation transfer and radiation pressure on plasma by magnetic degenerates --- stellar radiation N87-15845

RADIO ASTRONOMY
The Telecommunications and Data Acquisition Report [NASA-CR-179938] N87-15329
Sporadic narrowband radio emissions from Uranus [AD-A170947] N87-15826

RADIO COMMUNICATION
Economic and market aspects of land mobile satellite compared to terrestrial cellular radio N87-15365
Activities of the European Conference of Posts and Telecommunications (CEPT) special Group on Mobile Communications (GSM) N87-15385

RADIO EMISSION
Electrodynamics of inhomogeneous relativistic electron-positron plasma and radio emission of pulsars N87-15850
Investigation of subpulse drift in pulsars meaning the Coriolis force and inhomogeneities N87-15851

RADIO FREQUENCIES
Radio frequency monitoring of turbine generators N87-15412
Induced insulator voltage in transmitter antenna guy cables [AD-A169656] N87-15417
Printed circuit card hybrid [AD-D012448] N87-15428
High performance crystal oscillator development [AD-A172631] N87-15433
Comparison of measured and modeled radiation, heat and water vapor fluxes: FIFE pilot study [NASA-CR-179989] N87-15516

RADIO FREQUENCY INTERFERENCE
Highly decoupled cosited antennas [AD-D012446] N87-15399

RADIO NAVIGATION
The Telecommunications and Data Acquisition Report [NASA-CR-179938] N87-15329
The LOCSTAR satellite radiopositioning system N87-15386

RADIO RECEIVERS
Investigation of the UHF mobile-radio propagation channel in a temperate-zone forested environment [AD-A171431] N87-15403

RADIO RECEPTION
Investigation of the UHF mobile-radio propagation channel in a temperate-zone forested environment [AD-A171431] N87-15403

RADIO SIGNALS
Signal-to-noise ratio requirements for detection of multiple pulses subject to partially correlated fading with chi-squared statistics of various degrees of freedom [AD-A172223] N87-15405

RADIO SOURCES (ASTRONOMY)
Selection of radio sources for Venus balloon-Pathfinder Delta-DOR navigation at 1.7 GHz N87-15357

RADIO SPECTRA
Frequency spectrum allocation for a potential land mobile-satellite service N87-15380
Spectrum requirements for the land mobile satellite service, INMARSAT N87-15382

RADIO WAVES
Depolarization and scattering of electromagnetic waves [AD-A171217] N87-15401
The generation of radio waves in the inhomogeneous magnetic field of the pulsar magnetosphere N87-15849

RADIOGRAPHY
Improvement of image quality of radiograph by means of narrow area radiation method N87-15760
RADIOMETERS
PPM/NAR 8.4-GHz noise temperature statistics for DSN 64-meter antennas, 1982-1984 N87-15350
RADIOMETRIC RESOLUTION
A new algorithm for microwave delay estimation from water vapor radiometer data N87-15345
RAIN
An objective monitoring method for African rainfall based on Meteosat VIS and IR images — visible images (vis) N87-15586
Rainfall estimation over the Sahel using Meteosat thermal infra-red data N87-15587
Group Agromet Monitoring Project (GAMP) methodology integrated mapping of rainfall, evapotranspiration, germination, biomass development and thermal inertia, based on Meteosat and conventional meteorological data N87-15626
RAIN FORESTS
Importance of the tropical rain forest as an atmospheric moisture source N87-15608
RAIN GAGES
Hydrological studies in Niger N87-15609
RAMJET ENGINES
Numerical simulations of the flowfield in a central-dump ramjet combustor. Part 1: Test of the model and effects of forcing
[AD-A170936] N87-15229
An experimental investigation of combustion modulation techniques for a solid fuel ramjet
[AD-A172322] N87-15230
RANDOM PROCESSES
Randomized routing on fat trees
[AD-A171546] N87-15738
RANDOM VARIABLES
Large deviation local limit theorems for random vectors
[AD-A171176] N87-15746
RANGE AND RANGE RATE TRACKING
Development of Ku-band rendezvous radar tracking and acquisition simulation programs
[NASA-CR-171950] N87-15392
RANKING
An analysis method of strongly connected structure based on fundamental cycles N87-15761
RAREFIED GASES
Soviet research on the transport of intense relativistic electron beams through low-pressure air
[AD-A172274] N87-15783
RAREFIED PLASMAS
Control of ion-velocity distributions in laser-target interaction experiments
[AD-A172649] N87-15880
RATES (PER TIME)
Stress rates in continuum mechanics and computer codes
[AD-A172704] N87-15495
RAYLEIGH DISTRIBUTION
Signal-to-noise ratio requirements for detection of multiple pulses subject to partially correlated fading with chi-squared statistics of various degrees of freedom
[AD-A172223] N87-15405
RAYLEIGH SCATTERING
Application of Rayleigh scattering to turbulent flow with heat transfer and combustion
[AD-A172934] N87-15290
REACTION KINETICS
Study of the kinetics of catalytic decomposition of hydrazine vapors on palladium
[NASA-TM-88549] N87-15286
Measurement of atmospheric HO by a chemical method N87-15536
REACTION TIME
On the pilot's behavior of detecting a system parameter change
[NASA-TM-88479] N87-15695
REACTOR MATERIALS
Tensile behavior of helium-implanted and neutron-irradiated V-15Cr-5Ti
[DE86-007301] N87-15292
REACTOR SAFETY
What can we learn from nuclear engineering safety? N87-15326
Experimental investigations with notched samples of elastic-plastic materials behavior
[W-2/84] N87-15496
READING
Novice rules for assessing importance in scientific texts
[AD-A171551] N87-15698
REAL TIME OPERATION
Real-time combiner loss N87-15349
Systolic VLSI for Kalman filters N87-15360
Human real time perception in noise
[AD-A172374] N87-15899
Ada applications to real-time computer systems
[AD-A169493] N87-15723
Real time optimization of thin plate TIG arc welding N87-15759
Integrated optic modules for multichannel deflection/switching and signal processing
[AD-A171178] N87-15789
RECEIVERS
A synchronization technique for optical PPM signals N87-15332
Received optical power calculations for optical communications link performance analysis N87-15333
Investigation of millimeter wave propagation in the atmosphere
[AD-A171526] N87-15404
RED GIANT STARS
Seeing effects and their calibration for astronomical speckle interferometry N87-15914
REDUCED GRAVITY
Gas particle radiator
[NASA-CASE-LEW-14297-1] N87-15452
REENTRY GUIDANCE
Maximum-terminal-velocity guidance for a hypersonic glider N87-15202
REENTRY VEHICLES
The secret of guided missile re-entry
[AD-A169598] N87-15254
REFERENCE ATMOSPHERES
Short wave radiative fluxes at surface from NOAA satellites N87-15838
REFERENCE STARS
Selection of radio sources for Venus balloon-Pathfinder Delta-DOR navigation at 1.7 GHz N87-15357
REFLECTANCE
Canopy reflectance modeling in a tropical wooded grassland
[NASA-CR-180097] N87-15518
REFLECTOMETERS
Development of NbN Josephson Junction technology
[AD-A171057] N87-15885
REFLECTORS
Self-clamping arc light reflector for welding torch
[NASA-CASE-MFS-29207-1] N87-15786
REFRACTIVITY
Effects of strong diffraction on the focusing and scattering of acoustic waves
[AD-A171220] N87-15776
The influence of a high index microlens in a laser-taper coupling
[EUT-85-E-155] N87-15792
REFRIGERANTS
Single-substance, two-phase duct flow: A unified theoretical and experimental study N87-15438
REGRESSION ANALYSIS
An experimental investigation of combustion modulation techniques for a solid fuel ramjet
[AD-A172322] N87-15230
Estimation of vegetation cover at subpixel resolution using LANDSAT data
[NASA-CR-177077] N87-15514
Verification of mesoscale objective analyses of VAS and rawinsonde data using the March 1982 AVE/VAS special network data
[NASA-CR-179988] N87-15670
The stationary autogressive model
[AD-A171416] N87-15753
REGULATIONS
Land mobile satellite service: Regulatory aspects — frequency assignment N87-15379
RELATIVISTIC ELECTRON BEAMS
Radiation produced by the modulated electron beam of a free electron laser
[AD-A171168] N87-15457
Soviet research on the transport of intense relativistic electron beams through low-pressure air
[AD-A172274] N87-15783
Distortions of power-law of electrons in turbulent plasma reactor — decametric cosmic rays N87-15841
RELATIVISTIC PLASMAS
Relativistic plasmas in active galactic nuclei N87-15794
Electrodynamics of inhomogeneous relativistic electron-positron plasma and radio emission of pulsars N87-15850
Relativistic self-focusing of powerful electromagnetic radiation in plasma N87-15858
Instability in the system of counterstreaming relativistic plasmas N87-15867
RELATIVITY
Effective Einsteinian gravity from Poincare gauge field theory
[DE86-702874] N87-15897
RELIABILITY
LaRC conceptual design of solid rocket booster in-line bolted joint
[NASA-TM-89046] N87-15177
RELIABILITY ANALYSIS
A communication bandwidth model for shuffle-exchange and augmented shuffle-exchange interprocessor communication networks
[AD-A171287] N87-15402
Research on factors that affect the reliability of compressed gas insulated apparatus
[DE86-014417] N87-15437
Correctness conditions for highly available replicated databases
[AD-A171427] N87-15901
RELIABILITY ENGINEERING
What can we learn from nuclear engineering safety? N87-15326
The role for entropy and information in software reliability
[BAE-ST-30581] N87-15706
REMOTE HANDLING
Space spider crane
[NASA-CASE-LAR-13411-1] N87-15259
Mobile remote manipulator system for a tetrahedral truss
[NASA-CASE-MSC-20985-1] N87-15260
REMOTE SENSING
Indian remote sensing program N87-15242
Estimation of vegetation cover at subpixel resolution using LANDSAT data
[NASA-CR-177077] N87-15514
H.R. 4932: To amend land remote sensing commercialization
[GPO-64-491] N87-15515
Remote detection of OH N87-15536
Hydrologic models of land surface processes — soil moisture N87-15547
Modelisation of evapotranspiration and soil available water over an agricultural region applicable for remote sensing N87-15554
Remote sensing identified in climate model experiments with hydrological and albedo changes in the Sahel N87-15569
Evaluation of climate relevant land surface characteristics from remote sensing N87-15572
Remote sensing of land-surface temperature from HIRS/MSU data — High Resolution Infrared Sounder/Microwave Sounding Unit (HIRS/MSU) N87-15573
The prospects for hydrological measurements using ERS-1 — lakes N87-15588
Contribution of passive microwave remote sensing in soil moisture and evapotranspiration measurements N87-15589
Regional measurements of evapotranspiration using aircraft mounted sensors N87-15598
Use of remote sensing application for agricultural expansion into semi-arid areas of Kenya N87-15607
Hydrological studies in Niger N87-15609
Ground water-fed lakes in the Libyan desert: Their varying area as observed by means of LANDSAT-MSS data N87-15611
Systems approach to quantify desertifications processes using LANDSAT-MSS data N87-15613
The use of remote sensing techniques in the study of vegetation recovery after fire in mediterranean countries (a preliminary study) N87-15623
Remote sensing activites in Turkey: Possible contributions to climate studies N87-15624
Global and atmospheric radiation at ground from satellite data N87-15637
Multiangle or multiwavelength technique for remote sensing of sea surface temperature N87-15652
Emissivity as a function of surface roughness: A computer model
[AD-A172230] N87-15790
REMOTE SENSORS
Presentation of the status of the experiment Monocular Electro-Optical Stereo Scanner (MEOSS) N87-15245
Variations in in-flight absolute radiometric calibration — satellite remote sensors N87-15594
REMOTELY PILOTED VEHICLES
The unmanned air reconnaissance system
[AD-A171165] N87-15206
REPLICAS
Replicas and structural analysis: Criteria for the reliability of creep-loaded installations N87-15484
RESEARCH
Novice rules for assessing importance in scientific texts
[AD-A171551] N87-15698

RESEARCH AND DEVELOPMENT
Current status and expected developments in the area of satellite communications in the Latin American and Caribbean region
[NASA-TM-88000] N87-15395
Introduction to the Dutch Welding Institute project (residual) life N87-15480
NASA authorizations, fiscal year 1987
[GPO-61-975] N87-15904
A decision support system for space technology tradeoffs: A microcomputer application
[AD-A172379] N87-15910
RESEARCH FACILITIES
Reference Mission Operational Analysis Document (RMOAD) for the Life Sciences Research Facilities
[NASA-TM-89604] N87-15578
Computer facilities for high-speed data acquisition, signal processing and large scale system simulation
[AD-A170935] N87-15737
RESEARCH MANAGEMENT
Report of a discussion meeting on the structure of internal interfaces
[DE86-015730] N87-15302
Equipment concept design and development plans for microgravity science and applications research on space station: Combustion tunnel, laser diagnostic system, advanced modular furnace, integrated electronics laboratory
[NASA-CR-179535] N87-15320
RESIDUAL GAS
A new approach to non-invasive oxygenated mixed venous PCO(sub)2
[NASA-CR-171949] N87-15682
RESIDUAL STRENGTH
Residual life. Information Day of the Dutch Institute of Welding Techniques
[ETN-87-98730] N87-15479
Introduction to the Dutch Welding Institute project (residual) life N87-15480
Experimental program — residual life N87-15482
Short term creep tests N87-15487
Evaluation of the Dutch Welding Institute (residual) life project N87-15489
RESIDUES
Carbon residue studies with a micro carbon residue tester
[AD-A171153] N87-15306
RESOLUTION
Automatic parameterization and analysis of stellar atmospheres: A study of the DA white dwarfs N87-15918
RESONANCE
Photochemical ignition studies. Part 2: Oxygen-atom 2-photon resonance effects
[AD-A172974] N87-15483
RESONANCE FLUORESCENCE
Theoretical studies in free-electron lasers
[AD-A171174] N87-15458
RESPONSES
The effects of response modality on interference between stimulus dimensions
[AD-A171177] N87-15697
Use of disjunctive response requirements in dual-task environments: Implications for automation
[AD-A171277] N87-15702
RETROFITTING
Design considerations for the beam-waveguide retrofit of a ground antenna station N87-15331
REYNOLDS NUMBER
Transition fixing and simulation of high Reynolds number flow at transonic velocities N87-15169
Investigation of the components of the NAL high Reynolds number two-dimensional wind tunnel. Part 4: Design, construction and performance of the exhaust silencer
[NASA-TM-88513] N87-15237
RING STRUCTURES
Experimental evaluation of the ring focus test for X-ray telescopes using AXAF's technology mirror assembly, MSFC CDDF Project No. H20
[NASA-TM-88570] N87-15916
RISK
Air traffic control: FAA's (Federal Aviation Administration's) advanced automation system acquisition strategy is risky
[PB86-231743] N87-15200
Overview of major hazards research. Part 1: Of risk and all that — chemical and petrochemical industries N87-15322
Overview of major hazards. Part 2: Source term; dispersion; combustion; blast, missiles, venting; fire; radiation; runaway reactions; toxic substances; dust explosions N87-15323
ROADS
Economic aspects of communication in road transport N87-15368
Inertial surveying and the collection of data base information — road maps N87-15500
Computer-aided production of thematic maps for traffic data N87-15504
Automatic geometric correction after scanning — road mapping N87-15508
ROBOTICS
Control and simulation of a 3-jointed finger
[DE86-014303] N87-15469
End-point control of flexible manipulators
[AD-A172287] N87-15471
Electromagnetic sensor arrays for nondestructive evaluation and robot control
[AD-A171128] N87-15474
Adaptive control of robotic manipulators N87-15700
ROBOTS
Control and simulation of a 3-jointed finger
[DE86-014303] N87-15469
Robot system for dexterous tasks (for space applications)
[ETN-86-96562] N87-15472
Adaptive control of robotic manipulators N87-15700
ROCKET ENGINES
Interactions of coupled acoustic and vortical instabilities in rocket combustion chambers N87-15266
Breadboard RL10-11B low thrust operating mode
[NASA-CR-174914] N87-15269
ROCKS
Stress rates in continuum mechanics and computer codes
[AD-A172704] N87-15495
Astroblemes on trapp rock: Structural features and differences from impact structures on other targets
[NASA-TM-88484] N87-15921
ROLLER BEARINGS
Lubricant effects on bearing life
[NASA-TM-88875] N87-15467
ROLLING CONTACT LOADS
Lubricant effects on bearing life
[NASA-TM-88875] N87-15467
ROSAT MISSION
X-ray satellite (ROSAT)
[NASA-TM-88499] N87-15261
ROTARY WING AIRCRAFT
Wind tunnel data from a rotor wake/airframe interaction study
[AD-A171333] N87-15190
ROTARY WINGS
Dynamic stability of hingeless and bearingless rotor blades in forward flight N87-15201
The dynamic scaling and development of model helicopter rotor blades for the RAE 24ft wind tunnel test rig
[RAE-TR-85052] N87-15203
ROTATING FLUIDS
Drift vortices in plasma modelled on fast-rotating shallow field N87-15862
Gas rotation above the galactic disk N87-15873
ROTATING LIQUIDS
Vortex and spiral structures in sheared flows — shallow water plasma analogy N87-15866
ROTATION
Non-reference analysis of rotational accuracy with nanometer resolution on ultraprecision spindle N87-15770
ROTOR AERODYNAMICS
A comparison of the acoustic and aerodynamic measurements of a model rotor tested in two anechoic wind tunnels
[NASA-TM-88364] N87-15178
ROTOR BLADES (TURBOMACHINERY)
Time-resolved heat flux measurement for the rotor blade of a TFA-731-2 hp turbine N87-15212
ROTOR BODY INTERACTIONS
Wind tunnel data from a rotor wake/airframe interaction study
[AD-A171333] N87-15190
ROTORS
Application of higher harmonic blade feathering on the OH-6A helicopter for vibration reduction
[NASA-CR-4031] N87-15175
Non-reference analysis of rotational accuracy with nanometer resolution on ultraprecision spindle N87-15770
ROUTES
Randomized routing on fat trees
[AD-A171548] N87-15738
RUBIDIUM
A rubidium clock model
[AD-A171133] N87-15773
RUNWAYS
Facilities technology application tests: Fuel-resistant pavement sealers
[AD-A171473] N87-15238
RURAL AREAS
The United States mobile satellite service N87-15381
MSAT system and service description — mobile communications N87-15387
Modelisation of evapotranspiration and soil available water over an agricultural region applicable for remote sensing N87-15554
RURAL LAND USE
Mapping of agricultural lands in the USSR N87-15507
Use of remote sensing application for agricultural expansion into semi-arid areas of Kenya N87-15607
Monitoring of land-surface change in Sri Lanka N87-15618
RUTHENIUM COMPOUNDS
Digital simulation of the measured electrochemical response of reversible redox couples at microelectrode arrays: Consequences arising from closely spaced ultramicroelectrodes
[AD-A171272] N87-15427

S

S MATRIX THEORY
Nonlinear partial differential equations and related problems of pade approximations
[AD-A172253] N87-15748
SAFETY MANAGEMENT
Multiphase problems related to safety studies in the process industries N87-15324
What can we learn from nuclear engineering safety? N87-15326
SAHARA DESERT (AFRICA)
An approach to derive the radiation budget over the Sahara N87-15641
SAMPLING
Field test to intercompare carbon monoxide, nitric oxide and hydroxyl instrumentation at Wallops Island, Virginia
[NASA-TM-87718] N87-15524
SAN ANDREAS FAULT
Strain accumulation and surface deformation along the San Andreas, California
[NASA-CR-180058] N87-15657
SATELLITE ALTIMETRY
Undersea volcano production versus lithospheric strength from satellite altimetry
[NASA-CR-179984] N87-15660
SATELLITE ANTENNAS
L-band antennas for regional mobile communication satellites N87-15377
SATELLITE ATTITUDE CONTROL
Perturbation solutions of the equations of motion for a class of dual-spin spacecraft N87-15258
SATELLITE COMMUNICATION
Ground plane interference elimination by passive element
[NASA-CASE-NPO-16632-1-CU] N87-15390
Space Shuttle/TDRSS communication and tracking systems analysis
[NASA-CR-171948] N87-15391
Current status and expected developments in the area of satellite communications in the Latin American and Caribbean region
[NASA-TM-88000] N87-15395
SATELLITE CONFIGURATIONS
Status of launch vehicle, satellite and mission related activities for MEOSS — Mono Electro-Optical Stereo Scanner (MEOSS) N87-15244
SATELLITE CONTROL
ISRO telemetry, tracking and command network (ISTRA) N87-15249
SATELLITE DESIGN
Systems approach to quantify desertifications processes using LANDSAT-MSS data N87-15613
SATELLITE DOPPLER POSITIONING
The LOCSTAR satellite radiopositioning system N87-15386
SATELLITE IMAGERY
Estimation of vegetation cover at subpixel resolution using LANDSAT data
[NASA-CR-177077] N87-15514
H.R. 4932: To amend land remote sensing commercialization
[GPO-84-491] N87-15515
Modeling energy flow and nutrient cycling in natural semiarid grassland ecosystems with the aid of thematic mapper data
[NASA-CR-179903] N87-15517
An objective monitoring method for African rainfall based on Meteosat VIS and IR images — visible images (vis) N87-15586
Rainfall estimation over the Sahel using Meteosat thermal infra-red data N87-15587

The fundamental problems for the energy balance study by satellite imagery N87-15590
Estimation of regional evaporation using midday surface temperature from satellite thermal IR data N87-15591
Evaluation of the geostationary satellite images ground resolution — spatial resolution N87-15595
Effects of atmospheric aerosol size distributions on the retrieval of surface spectral radiance from satellite N87-15596
Ground based atmospheric extinction measurement in the Sahel — satellite monitoring N87-15597
Location finding using meteorological satellite images N87-15600
Assessment of wind and fluvial action by using LANDSAT-MSS color composites in the lower Nile Valley (Egypt) N87-15612
The application of LANDSAT imagery for land cover assessment — Thailand N87-15614
Surface albedo change in arid regions in the Sudan N87-15615
Monitoring of land-surface change in Sri Lanka N87-15618
An integrated system to assess agricultural productivity — satellite imagery N87-15621
AVHRR and MSS data based vegetation indices studies over Indian sites — NOAA radiometer (AVHRR) LANDSAT multispectral scanner (MSS) N87-15622
Estimation of global, direct and diffuse radiation from satellite images by statistical methods N87-15639
Temporal, spectral, and spatial samplings: Problem in radiation budget measurements — Earth radiation N87-15640
Errors and uncertainties in satellite derived albedo — Meteosat N87-15643
Estimation of atmospheric turbidity — satellite imagery N87-15645
Cloud detection and classification over oceans at night with NOAA-7 N87-15651
Estimate of broadband conversion factors for the Meteosat VIS channel N87-15653
Investigation into alternative statistical auroral oval models, stage 1 [NASA-CR-180061] N87-15656
Mountain building processes in the Central Andes [NASA-CR-180089] N87-15661

SATELLITE NETWORKS
Satellite communications — India N87-15251
PRODAT system architecture — communication network N87-15371
The INMARSAT Standard-C service N87-15372
The LOCSTAR satellite radiopositioning system N87-15386
MSAT system and service description — mobile communications N87-15387
Hydrological Atmospheric Pilot Experiment (HAPEX) hydrology budget modeling (MOBILHY): Outline of the program N87-15632

SATELLITE OBSERVATION
Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference [ESA-SP-248] N87-15544
Two years of the International Satellite Land-Surface Climatology Project (ISLSCP) N87-15545
Remote sensing of land-surface temperature from HIRS/MSU data — High Resolution Infrared Sounder/Microwave Sounding Unit (HIRS/MSU) N87-15573
Surface temperature from AVHRR and TOVS from the meteorological satellite NOAA 9 N87-15574
Surface radiation budget for climate applications N87-15575
Inference of the shortwave radiation at ground from International Satellite Cloud Climatology Project (ISCCP) data sets N87-15576
Solar irradiance at the Earth's surface from NOAA satellites N87-15577
Downward longwave radiation at the surface in clear-sky atmospheres: Comparisons of measured, satellite-derived, and calculated fluxes N87-15578
Estimation of surface albedo using satellite data. A simple formulation for atmospheric effects N87-15579
Clear land anisotropy conversion factors: A comparison of theoretical and experimental results — Earth atmosphere N87-15581
Satellite-derived vegetation index over Europe N87-15583
Calibration of normalized vegetation index against pasture growth — NOAA-7 data N87-15585
An objective monitoring method for African rainfall based on Meteosat VIS and IR images — visible images (vis) N87-15586
Sonic anemometer surface heat flux measurements for validation of satellite observations N87-15599
Variation in surface albedo and energy-balance in an arctic/subarctic environment N87-15616
Design of a data base system for inferring land surface parameters and fluxes from satellite radiances N87-15625
The first International Satellite Land Surface Climatology Project (ISLSCP) Field Experiment - FIFE N87-15629
Satellite Measurements of Radiation Budget of the Earth (3rd Symposium) [BMFT-FB-W-86-011] N87-15630
Derivation of surface properties from satellite observations N87-15642
Uncertainty of satellite derived clear sky shortwave radiation budget N87-15644

SATELLITE PERTURBATION
Perturbation solutions of the equations of motion for a class of dual-spin spacecraft N87-15258

SATELLITE SOUNDING
Short wave radiative fluxes at surface from NOAA satellites N87-15638
An approach to derive the radiation budget over the Sahara N87-15641

SATELLITE SURFACES
Cratering mechanics [NASA-TM-88477] N87-15662

SATELLITE TRACKING
ISRO telemetry, tracking and command network (ISTRA) N87-15249

SATELLITE TRANSMISSION
Satellite communications — India N87-15251

SATELLITE-BORNE INSTRUMENTS
Status of ISRO/DFVLR cooperation N87-15241
SABREX: A 90 GHz radiometer experiment on a Rohini satellite — Satellite Borne Radiometer Experiment (SABREX) N87-15243
Presentation of the status of the experiment Monocular Electro-Optical Stereo Scanner (MEOSS) N87-15245
Multiangle or multiwavelength technique for remote sensing of sea surface temperature N87-15652

SATELLITE-BORNE PHOTOGRAPHY
Presentation of the status of the experiment Monocular Electro-Optical Stereo Scanner (MEOSS) N87-15245

SCALARS
Scalar fields in Kasner-type space-times: Time dependent vacuum expectation values [DE86-702622] N87-15896

SCALE EFFECT
The scaling of film cooling: Theoretical and experimental results — gas turbines N87-15222

SCALE MODELS
Spatial scale in image detection and recognition [AD-A171348] N87-15691

SCALING LAWS
The dynamic scaling and development of model helicopter rotor blades for the RAE 24ft wind tunnel test rig [RAE-TR-85052] N87-15203

SCANNERS
Seventh International Summer Institute in Surface Science [AD-A171449] N87-15287

SCANNING
Automatic geometric correction after scanning — road mapping N87-15508

SCATTER PROPAGATION
Investigation of millimeter wave propagation in the atmosphere [AD-A171526] N87-15404

SCATTERING CROSS SECTIONS
Depolarization and scattering of electromagnetic waves [AD-A171217] N87-15401

SCIENTIFIC SATELLITES
Thermosphere structure variations during high solar and magnetic activity conditions [AD-A171350] N87-15666

SEA STATES
Emissivity as a function of surface roughness: A computer model [AD-A172230] N87-15790

SEA SURFACE TEMPERATURE
Multiangle or multiwavelength technique for remote sensing of sea surface temperature N87-15652
Emissivity as a function of surface roughness: A computer model [AD-A172230] N87-15790

SEALERS
Facilities technology application tests: Fuel-resistant pavement sealers [AD-A171473] N87-15238

SEALS (STOPPERS)
LaRC conceptual design of solid rocket booster in-line bolted joint [NASA-TM-89046] N87-15177
Evaluation of seals for high-performance cryogenic turbomachines [NASA-TM-88919] N87-15442

SEAMOUNTS
Undersea volcano production versus lithospheric strength from satellite altimetry [NASA-CR-179984] N87-15660

SEATS
Seat experiment results of full-scale transport aircraft controlled impact demonstration [AD-A172245] N87-15193

SECONDARY INJECTION
An experimental investigation of combustion modulation techniques for a solid fuel ramjet [AD-A172322] N87-15230

SEISMOLOGY
Strain accumulation and surface deformation along the San Andreas, California [NASA-CR-180058] N87-15657

SEMANTICS
Specifications in natural semantics. Deliverable D4 of task T4, annex 2 — programming languages N87-15718
Proposal for an algebraic semantics definition formalism. Annexe D4.A3 of deliverable D4 - second review — programming languages [CWI-CS-R8504] N87-15719

SEMICONDUCTING FILMS
Photoinduced effects in polythiophene film N87-15765
Laser-induced chemical vapor deposition of germanium and doped-germanium films [AD-D012462] N87-15888

SEMICONDUCTOR LASERS
Self-induced frequency scanning and distributed bragg reflection in semiconductor lasers with phase-conjugate feedback [AD-A172933] N87-15461

SEMICONDUCTORS (MATERIALS)
The barium iron ruthenium oxide system [NASA-TM-88451] N87-15284
Current- and lattice-matched tandem solar cell [DE86-013757] N87-15521
Method for growing low defect, high purity crystalline layers utilizing lateral overgrowth of a patterned mask [NASA-CASE-NPO-15813-2] N87-15882
Preparation and characterization of several 2-4-V2 stannite single crystals [AD-A172238] N87-15890
Study of transient phonon dynamics [AD-A172691] N87-15892
Characterization of infrared properties of layer semiconductors [AD-A172692] N87-15893

SENSE ORGANS
End-point control of flexible manipulators [AD-A172287] N87-15471

SENSITIVITY
Tailorable infrared sensing device with strain layer superlattice structure [NASA-CASE-NPO-16607-1] N87-15883

SENSORS
Development of N(2) sensor for determination of PN(2) in body tissues [AD-A171330] N87-15690

SEPARATED FLOW
Simulation of two-dimensional internal incompressible separated flows with heat transfer N87-15439

SERVICE LIFE
Small, self-contained aircraft fatigue data recorder [AD-A172400] N87-15207
Method and apparatus for increasing service life of augmentor and combustion chamber liners [AD-D012443] N87-15273
Method of increasing the useful life of rechargeable lithium batteries [AD-D012444] N87-15421
Lubricant effects on bearing life [NASA-TM-88875] N87-15467

SERVOCONTROL
Antenna servo control system characterization: Rate loop analysis for 34-m antenna at DSS 15 N87-15347

SET THEORY
Application of Barlow-Wu systems to safety monitoring systems N87-15757

SEYFERT GALAXIES
EX56a study of extended X-ray emission around isolated galaxies EX56b identification and spectra of bright X-ray sources at high galactic latitude [NASA-CR-180099] N87-15931

SHALLOW WATER
Vortex and spiral structures in sheared flows — shallow water plasma analogy N87-15866

SHAPE MEMORY ALLOYS
Ferroic shape memory materials and Piezo:Pyro-Electric oriented recrystallized glasses [AD-A171409] N87-15309

SHAPES
Basic theory of diameter control in Czochralski growth using the melt-weighing technique
[DE86-752529] N87-15884
SHARP LEADING EDGES
Applicability of linearized-theory attached-flow methods to design and analysis of flap systems at low speeds for thin swept wings with sharp leading edges
[NASA-TP-2653] N87-15174
SHEAR FLOW
Vortical dissipation in two-dimensional shear flows
[NASA-TM-89408] N87-15445
Spontaneous reconnection in the Earth's magnetotail N87-15825
Vortex and spiral structures in sheared flows — shallow water plasma analogy N87-15866
SHEAR PROPERTIES
Shear localization in rate and temperature dependent solids N87-15477
SHEAR STRESS
An endochronic rate-sensitive constitutive equation for metals: Application to generalized creep
[AD-A172705] N87-15296
Stress rates in continuum mechanics and computer codes
[AD-A172704] N87-15495
Issues concerning the evaluation of effective surface roughness of heterogeneous terrain N87-15556
SHEARING
Prefiare acceleration by magnetic trapping in shearing arcades — solar flares N87-15811
SHIPS
Spatial scale in image detection and recognition
[AD-A171348] N87-15691
SHOCK HEATING
Resonant ion acceleration by magnetosonic shock waves N87-15827
Very hot interstellar matter heated by a galactic shock wave N87-15828
SHOCK TUBES
Development of instrumentation to measure sound speed and flow direction in dusty flow fields
[AD-A171050] N87-15453
SHOCK WAVE INTERACTION
Acoustic wave collapse effect on the structure of collisionless shock waves in magnetized plasma N87-15861
SHOCK WAVE PROFILES
Influence of reflected ions on the front structure of quasi-perpendicular collisionless shock waves N87-15829
The role of cosmic rays in supernovae shock dynamics N87-15832
SHOCK WAVES
Mechanics of shear rupture applied to earthquake zones
[NASA-CR-180070] N87-15663
Resonant ion acceleration by magnetosonic shock waves N87-15827
Very hot interstellar matter heated by a galactic shock wave N87-15828
Monte Carlo simulation of particle acceleration by shock waves — cosmic plasma N87-15830
Injection mechanism for the cosmic ray acceleration by shocks N87-15835
SHORT WAVE RADIATION
Inference of the shortwave radiation at ground from International Satellite Cloud Climatology Project (ISCCP) data sets N87-15576
Short wave radiative fluxes at surface from NOAA satellites N87-15638
Uncertainty of satellite derived clear sky shortwave radiation budget N87-15644
SIDELOBES
Predicting antenna sidelobe performance
[AD-A172708] N87-15408
SIGNAL ANALYZERS
Development of instrumentation to measure sound speed and flow direction in dusty flow fields
[AD-A171050] N87-15453
Human real time perception in noise
[AD-A172374] N87-15699
SIGNAL DETECTION
Transition detection using surface pressure holes N87-15170
Investigation of the experimental detection of boundary layer transition N87-15171
Signal-to-noise ratio requirements for detection of multiple pulses subject to partially correlated fading with chi-squared statistics of various degrees of freedom
[AD-A172223] N87-15405
Computer facilities for high-speed data acquisition, signal processing and large scale system simulation
[AD-A170935] N87-15737
SIGNAL MEASUREMENT
Table look-up estimation of signal and noise parameters from quantized observables N87-15341
SIGNAL PROCESSING
Signal processing in ultrasonic NDE (nondestructive evaluation)
[AD-A172687] N87-15475
The modulation transfer of the Airborne Version of the Conical Scan Radiometer (AVCSR) N87-15654
Computer facilities for high-speed data acquisition, signal processing and large scale system simulation
[AD-A170935] N87-15737
Nonlinear optical apparatus using optical fibers
[AD-D012439] N87-15787
Integrated optic modules for multichannel deflection/switching and signal processing
[AD-A171178] N87-15789
SIGNAL TO NOISE RATIOS
Signal-to-noise ratio requirements for detection of multiple pulses subject to partially correlated fading with chi-squared statistics of various degrees of freedom
[AD-A172223] N87-15405
SIGNATURES
Undersea volcano production versus lithospheric strength from satellite altimetry
[NASA-CR-179984] N87-15660
SILENCERS
Investigation of the components of the NAL high Reynolds number two-dimensional wind tunnel. Part 4: Design, construction and performance of the exhaust silencer
[NASA-TM-88513] N87-15237
SILICA GLASS
Ferroic shape memory materials and Piezo:Pyro-Electric oriented recrystallized glasses
[AD-A171409] N87-15309
SILICON
Effect of light-soaking on electronic properties of glow-discharged hydrogenated amorphous silicon N87-15763
Selective hydrogen passivation of oxygen-related thermal-donor clusters in silicon
[DE86-014718] N87-15894
SILICON COMPOUNDS
Preparation and characterization of several 2-4-V2 stannite single crystals
[AD-A172238] N87-15890
SIMULATION
Development of Ku-band rendezvous radar tracking and acquisition simulation programs
[NASA-CR-171950] N87-15392
An experimental and theoretical study of nuclear-EMP (electromagnetic pulse)-type lightning simulators with combined peaking capacitor and crowbar
[AD-A172648] N87-15407
Development of instrumentation to measure sound speed and flow direction in dusty flow fields
[AD-A171050] N87-15453
Control and simulation of a 3-jointed finger
[DE86-014303] N87-15469
Laboratory simulation of collisionless coupling between supernova remnants and magnetized interstellar medium N87-15798
SIMULATORS
Weightlessness simulation system and process
[NASA-CASE-ARC-11646-1] N87-15253
An experimental and theoretical study of nuclear-EMP (electromagnetic pulse)-type lightning simulators with combined peaking capacitor and crowbar
[AD-A172648] N87-15407
SINGLE CRYSTALS
Preparation and characterization of several 2-4-V2 stannite single crystals
[AD-A172238] N87-15890
SINGLE SIDEBAND TRANSMISSION
A comparison of single-sideband, suppressed-carrier and double-sideband, full-carrier amplitude modulation
[P-7254] N87-15394
SINGULARITY (MATHEMATICS)
Simple formulas for strain-energy release rates with higher order and singular finite elements
[NASA-CR-178186] N87-15490
SKIN FRICTION
Drag predictions for projectiles at transonic and supersonic speeds
[AD-A171462] N87-15191
SKIN TEMPERATURE (NON-BIOLOGICAL)
Variation of skin temperature in desert regions in the neighbourhood of India in relation to Asian monsoon circulation N87-15820
SKY RADIATION
Downward longwave radiation at the surface in clear-sky atmospheres: Comparisons of measured, satellite-derived, and calculated fluxes N87-15578
Uncertainty of satellite derived clear sky shortwave radiation budget N87-15644
SKYLAB PROGRAM
Theoretical analysis of segmented Wolter/LSM X-ray telescope systems
[NASA-CR-178966] N87-15915
SMALL PERTURBATION FLOW
An efficient algorithm for solution of the unsteady transonic small-disturbance equation
[NASA-TM-89014] N87-15176
SMOKE
Inhalation toxicology. Part 7: Times to incapacitation and death for rats exposed continuously to atmospheric acrolein vapor
[AD-A169366] N87-15680
SNOW COVER
Climatic effect of snowfall anomaly in mid-high latitudes in a one-dimensional air-land model N87-15567
SOFTWARE ENGINEERING
Handbook. Volume 1: Validation of digital systems in avionics and flight control applications
[DOT/FAA/CT-82/115-VOL-1-REV] N87-15204
The role for entropy and information in software reliability
[BAE-ST-30581] N87-15706
Generation of Interactive Programming Environments (GIPE)
[CWI-CS-R8620] N87-15707
Generation of Interactive Programming Environments (GIPE). Outline of the GIPE project N87-15708
Establishment of a common environment. Deliverable D1 of task T1 - second review — computer programming N87-15709
Global outline of an environment generation system. Deliverable D5 of task T5 - second review — computer programming N87-15720
An investigation of expert systems usage for software requirements development in the strategic defense initiative environment
[AD-A169659] N87-15724
SOFTWARE TOOLS
Software development for the VLA-GDSCC telemetry array project N87-15348
Generation of Interactive Programming Environments (GIPE)
[CWI-CS-R8620] N87-15707
Generation of Interactive Programming Environments (GIPE). Outline of the GIPE project N87-15708
An investigation of expert systems usage for software requirements development in the strategic defense initiative environment
[AD-A169659] N87-15724
SOIL EROSION
Assessment of wind and fluvial action by using LANDSAT-MSS color composites in the lower Nile Valley (Egypt) N87-15612
SOIL MOISTURE
Hydrologic models of land surface processes — soil moisture N87-15547
Modelisation of evapotranspiration and soil available water over an agricultural region applicable for remote sensing N87-15554
A boundary layer and soil moisture for use in GCMs — General Circulation Models (GCM) N87-15555
On changes in soil moisture in CO2 climate studies N87-15568
Contribution of passive microwave remote sensing in soil moisture and evapotranspiration measurements N87-15589
SOILS
Modeling energy flow and nutrient cycling in natural semiarid grassland ecosystems with the aid of thematic mapper data
[NASA-CR-179903] N87-15517
SOLAR ACTIVITY
Thermosphere structure variations during high solar and magnetic activity conditions
[AD-A171350] N87-15666
The two state structure of the solar wind and its influence upon proton temperatures in the inner heliosphere. Observations of Helios 1 and Helios 2 N87-15929
SOLAR ACTIVITY EFFECTS
Thermosphere structure variations during high solar and magnetic activity conditions
[AD-A171350] N87-15666
Cosmic ray archaeology, solar activity and supernova explosions N87-15831
SOLAR ARRAYS
Space station experiment definition: Advanced power system test bed
[NASA-CR-179502] N87-15270
SOLAR CELLS
Rugged, thin GaAs solar cell development, phase 1
[AD-A171188] N87-15520
Current- and lattice-matched tandem solar cell
[DE86-013757] N87-15521

Transactions of the symposia on space nuclear power systems: Summaries
[DE86-005726] N87-15785

SOLAR CORONA

Energy dissipation and convective motors in the local MHD-resonance regions in solar chromosphere N87-15806

Topological stability of magnetic fields in spatial domains with boundaries and finite-length field lines N87-15812

Some interesting features in the drift pair phenomena of solar decametric radiation N87-15813

Magnetic energy dissipation in a rarefied plasma by the relaxation process — solar corona N87-15824

SOLAR DYNAMIC POWER SYSTEMS

Electrical power system design for the US space station
[NASA-TM-88824] N87-15267

SOLAR ENERGY CONVERSION

High-temperature composite thermal energy storage for solar applications
[DE86-014161] N87-15522

SOLAR FLARES

Ion acceleration in solar flares enriched by helium-3 and in gamma-ray line flares N87-15808

Preflare acceleration by magnetic trapping in shearing arcades — solar flares N87-15811

Topological stability of magnetic fields in spatial domains with boundaries and finite-length field lines N87-15812

SOLAR GENERATORS

Transactions of the symposia on space nuclear power systems: Summaries
[DE86-005726] N87-15785

SOLAR MAGNETIC FIELD

Preflare acceleration by magnetic trapping in shearing arcades — solar flares N87-15811

SOLAR OSCILLATIONS

Helioseismology and the internal structure of the Sun N87-15807

SOLAR POWER SATELLITES

Technology for large space systems: A bibliography with indexes (supplement 15)
[NASA-SP-7046(15)] N87-15239

SOLAR PROMINENCES

Propagation of nonlinear modulated Alfven waves in spicules and magnetic flux tubes N87-15809

SOLAR RADIATION

Fraunhofer filters to reduce solar background for optical communications N87-15335

Inference of the shortwave radiation at ground from International Satellite Cloud Climatology Project (ISCCP) data sets N87-15576

Solar irradiance at the Earth's surface from NOAA satellites N87-15577

Downward longwave radiation at the surface in clear-sky atmospheres: Comparisons of measured, satellite-derived, and calculated fluxes N87-15578

Clear land anisotropy conversion factors: A comparison of theoretical and experimental results — Earth atmosphere N87-15581

Measuring and modeling solar irradiance on vertical surfaces
[DE86-010737] N87-15668

SOLAR RADIO EMISSION

Some interesting features in the drift pair phenomena of solar decametric radiation N87-15813

Magnetospheric and solar radiation from loss-cone driven fast instabilities N87-15839

SOLAR SPECTRA

Fraunhofer filters to reduce solar background for optical communications N87-15335

Some interesting features in the drift pair phenomena of solar decametric radiation N87-15813

SOLAR TERRESTRIAL INTERACTIONS

Radiation budget variations caused by thin cirrus N87-15836

The problem of the MHD flow near stagnation point of the current sheet — geomagnetism-solar wind N87-15817

SOLAR WIND

A fluid simulation of the AMPTE neutral gas release in the solar wind N87-15819

Mass loading and MHD turbulence in the solar wind/comet interaction region N87-15836

The two state structure of the solar wind and its influence upon proton temperatures in the inner heliosphere. Observations of Helios 1 and Helios 2 N87-15929

SOLID PROPELLANT COMBUSTION

The use of electrical discharge for ignition and control of combustion of solid propellants
[NASA-TM-88548] N87-15317

SOLID PROPELLANT IGNITION

The use of electrical discharge for ignition and control of combustion of solid propellants
[NASA-TM-88548] N87-15317

SOLID PROPELLANT ROCKET ENGINES

LaRC conceptual design of solid rocket booster in-line bolted joint
[NASA-TM-89046] N87-15177

SOLID ROCKET PROPELLANTS

Surveillance report. Stage 1: Dissected Motor/Propellant Motor Number 0012029
[AD-A171132] N87-15274

SOLIDIFICATION

Ultrasonic backscatter and attenuation measurements for microstructure characterization: Application to consolidated rapidly solidified type 304 stainless steel powder
[DE86-014917] N87-15300

High temperature monotonic and cyclic deformation in a directionally solidified nickel-base superalloy
[NASA-CR-175101] N87-15303

SOLIDS

Shear localization in rate and temperature dependent solids N87-15477

SOLITARY WAVES

Investigation on the intensity progression of F-region nightglow emission of the oxygen red line by means of atmospheric gravity waves soliton N87-15816

Revision of the theory of gradient solitons — plasma drift N87-15865

Radiation of ion-acoustic waves by supersonic soliton N87-15868

SOLVENT EXTRACTION

Infusion extractor
[NASA-CASE-MSC-20761-1] N87-15465

SONIC ANEMOMETERS

Sonic anemometer surface heat flux measurements for validation of satellite observations N87-15599

SONIC BOOMS

Exploratory study of the potential effects of exposure to sonic boom on human health. Volume 2: Epidemiological study
[AD-A170953] N87-15686

Effect of sonic boom on avalanches. Preparation for flight of a supersonic jet over the Lavay Valley
[NASA-TM-88535] N87-15775

SOUND WAVES

Effects of strong diffraction on the focusing and scattering of acoustic waves
[AD-A171220] N87-15776

Research in nonlinear acoustics
[AD-A172634] N87-15777

SOUTH DAKOTA

Modeling energy flow and nutrient cycling in natural semiarid grassland ecosystems with the aid of thematic mapper data
[NASA-CR-179903] N87-15517

SPACE CHARGE

Research for electric energy systems
[DE86-012716] N87-15435

SPACE COMMERCIALIZATION

Equipment concept design and development plans for microgravity science and applications research on space station: Combustion tunnel, laser diagnostic system, advanced modular furnace, integrated electronics laboratory
[NASA-CR-179535] N87-15320

H.R. 4932: To amend land remote sensing commercialization
[GPO-64-491] N87-15515

H.R. 4316 and H.R. 3112: Inventions in outer space
[GPO-64-526] N87-15905

SPACE COMMUNICATION

The Telecommunications and Data Acquisition Report
[NASA-CR-179938] N87-15329

Relative performance of 8.5-GHz and 32-GHz telemetry links on the basis of total data return per pass N87-15337

A generalized algorithm to design finite field normal basis multipliers N87-15343

SPACE ENVIRONMENT SIMULATION

Magnetic reconnection, generation of plasma fluxes and accelerated particles in laboratory experiments and space plasma N87-15821

SPACE ERECTABLE STRUCTURES

Technology for large space systems: A bibliography with indexes (supplement 15)
[NASA-SP-7046(15)] N87-15239

SPACE LAW

H.R. 4316 and H.R. 3112: Inventions in outer space
[GPO-64-526] N87-15905

SPACE MISSIONS

USSR Space Life Sciences Digest, issue 9
[NASA-CR-3922(10)] N87-15679

SPACE PLASMAS

Magnetic reconnection, generation of plasma fluxes and accelerated particles in laboratory experiments and space plasma N87-15821

Magnetic boundary and acceleration of charged particles in spatially nonuniform configurations — space plasmas N87-15822

Quantum effects in synchronization radiation of a plasma in superstrong magnetic fields of neutron stars N87-15846

SPACE PLATFORMS

Electrical power system design for the US space station
[NASA-TM-88824] N87-15267

SPACE POWER REACTORS

Transactions of the symposia on space nuclear power systems: Summaries
[DE86-005726] N87-15785

SPACE PROCESSING

Equipment concept design and development plans for microgravity science and applications research on space station: Combustion tunnel, laser diagnostic system, advanced modular furnace, integrated electronics laboratory
[NASA-CR-179535] N87-15320

Infusion extractor
[NASA-CASE-MSC-20761-1] N87-15465

SPACE SHUTTLE MAIN ENGINE

Studies and analyses of the Space Shuttle Main Engine: SSME failure data review, diagnostic survey and SSME diagnostic evaluation
[NASA-CR-178993] N87-15268

A locally implicit method for fluid flow problems
[NASA-CR-178989] N87-15443

Grid generation for turbomachinery problems
[NASA-CR-178988] N87-15745

SPACE SHUTTLES

Space Shuttle/TDRSS communication and tracking systems analysis
[NASA-CR-171948] N87-15391

Development of Ku-band rendezvous radar tracking and acquisition simulation programs
[NASA-CR-171950] N87-15392

Human real time perception in noise
[AD-A172374] N87-15699

SPACE STATIONS

Mobile remote manipulator system for a tetrahedral truss
[NASA-CASE-MSC-20965-1] N87-15260

Electrical power system design for the US space station
[NASA-TM-88824] N87-15267

Equipment concept design and development plans for microgravity science and applications research on space station: Combustion tunnel, laser diagnostic system, advanced modular furnace, integrated electronics laboratory
[NASA-CR-179535] N87-15320

SPACE SUITS

Weightlessness simulation system and process
[NASA-CASE-ARC-11646-1] N87-15253

SPACE TRANSPORTATION SYSTEM

LaRC conceptual design of solid rocket booster in-line bolted joint
[NASA-TM-89046] N87-15177

National Aeronautics and Space Administration N87-15908

SPACE-TIME FUNCTIONS

Spontaneous compactification of extra dimensions in eleven-dimensional quantum gravity
[DE86-702620] N87-15895

Scalar fields in Kasner-type space-times: Time dependent vacuum expectation values
[DE86-702622] N87-15896

SPACEBORNE TELESCOPES

X-ray satellite (ROSAT)
[NASA-TM-88499] N87-15261

SPACECRAFT ANTENNAS

Model of a shaped-beam emission pattern of a satellite antenna for interference analysis
[PB86-238755] N87-15410

SPACECRAFT COMMUNICATION

Relative performance of 8.5-GHz and 32-GHz telemetry links on the basis of total data return per pass N87-15337

Space Shuttle/TDRSS communication and tracking systems analysis
[NASA-CR-171948] N87-15391

SPACECRAFT COMPONENTS

Robot system for dexterous tasks (for space applications)
[ETN-86-98562] N87-15472

SPACECRAFT CONSTRUCTION MATERIALS

Possible areas of collaboration between DFVLR and ISRO in the fields of structures and materials N87-15252

SPACECRAFT CONTAMINATION

Shuttle contamination modeling: Evolution of ionized shuttle exhaust, environmental research papers
[AD-A172276] N87-15257

SPACECRAFT LAUNCHING
Air breathing jet engines for satellite launcher vehicles. Analysis and comparison of suitable propulsion concepts N87-15226
SPACECRAFT POWER SUPPLIES
Electrical power system design for the US space station
[NASA-TM-88824] N87-15267
Transactions of the symposia on space nuclear power systems: Summaries
[DE86-005726] N87-15785
SPACECRAFT PROPULSION
Thermodynamic and Flow Mechanical Problems in Aircraft and Spacecraft Drives. Summary of conference reports for 1974, 1975, 1976
[ETN-87-98750] N87-15223
SPACECRAFT RADIATORS
Gas particle radiator
[NASA-CASE-LEW-14297-1] N87-15452
SPANWISE BLOWING
Low-speed aerodynamic characteristics of a wing-canard configuration with underwing spanwise blowing on the trailing-edge flap system
[NASA-TM-89020] N87-15180
SPATIAL DISTRIBUTION
Structure of the Coma cluster of galaxies N87-15917
SPATIAL FILTERING
Spatial scale in image detection and recognition
[AD-A171348] N87-15691
SPATIAL RESOLUTION
Evaluation of the geostationary satellite images ground resolution — spatial resolution N87-15595
The effect of viewing aspect on climatological cloud distribution
[AD-A170440] N87-15672
SPECIFICATIONS
Interfaces between LISP and PROLOG. Deliverable D2.A1 of task 2 N87-15713
Specifications in natural semantics. Deliverable D4 of task T4, annex 2 — programming languages N87-15718
Partial evaluation and omega-completeness of algebraic specifications. Annexe D5.A1 of deliverable D5 - second review — computer systems programs
[CWI-CS-R8501] N87-15721
A rubidium clock model
[AD-A171133] N87-15773
SPECTRAL EMISSION
X-ray spectroscopy with Z-pinch neon plasmas
[AD-A172228] N87-15679
SPECTRAL REFLECTANCE
Estimation of vegetation cover at subpixel resolution using LANDSAT data
[NASA-CR-177077] N87-15514
SPECTRAL RESOLUTION
Estimation of vegetation cover at subpixel resolution using LANDSAT data
[NASA-CR-177077] N87-15514
Remote detection of OH N87-15536
SPECTRAL SENSITIVITY
Ultrasensitive detection of atmospheric trace gases using frequency modulation spectroscopy N87-15535
Tunable-diode laser absorption spectrometry N87-15543
SPECTROSCOPY
A spectral analysis of RV Tauri variables N87-15912
SPECTRUM ANALYSIS
Effects of atmospheric aerosol size distributions on the retrieval of surface spectral radiance from satellite N87-15596
A spectral analysis of RV Tauri variables N87-15912
SPEECH
The effects of response modality on interference between stimulus dimensions
[AD-A171177] N87-15697
SPEECH RECOGNITION
The use of interactive voice systems to improve multiple-task performance
[AD-A171492] N87-15703
SPHERES
Depolarization and scattering of electromagnetic waves
[AD-A171217] N87-15401
SPHERICAL HARMONICS
Effects of the oceans on polar motion: Extended investigations
[NASA-CR-180066] N87-15677
SPICULES
Propagation of nonlinear modulated Alfven waves in spicules and magnetic flux tubes N87-15809
SPIN DYNAMICS
Seventh International Summer Institute in Surface Science
[AD-A171449] N87-15287
SPIN STABILIZATION
Perturbation solutions of the equations of motion for a class of dual-spin spacecraft N87-15258
SPINDLES
Non-reference analysis of rotational accuracy with nanometer resolution on ultraprecision spindle N87-15770
SPIRAL ANTENNAS
Radiation resistance of thin antennas of arbitrary elevation and configuration over perfectly conducting ground
[AD-A170945] N87-15397
SPIRAL GALAXIES
Magnetic fields of spiral galaxies N87-15871
Infrared and CCD photometric study of spiral galaxies N87-15913
SRI LANKA
Monitoring of land-surface change in Sri Lanka N87-15618
STABILITY
Long-term amplitude and phase stability of the 400-kW 2.115-GHz transmitter N87-15338
STAGNATION POINT
The problem of the MHD flow near stagnation point of the current sheet — geomagnetism-solar wind N87-15817
STAINLESS STEELS
An endochronic rate-sensitive constitutive equation for metals: Application to generalized creep
[AD-A172705] N87-15298
Ultrasonic backscatter and attenuation measurements for microstructure characterization: Application to consolidated rapidly solidified type 304 stainless steel powder
[DE86-014917] N87-15300
STANTON NUMBER
Low aspect ratio turbine stage without cooling-gas injection N87-15211
STAR CLUSTERS
Kinetic equation for Hamiltonian systems integrable in the mean field approximation — globular star clusters N87-15795
STARS
Support of Mark 3 optical interferometer
[AD-A171135] N87-15788
STATE VECTORS
Application of Barlow-Wu systems to safety monitoring systems N87-15757
STATIC ELECTRICITY
International Aerospace and Ground Conference on Lightning and Static Electricity. Technical papers: The key to lightning technology, held in Orlando, Florida on 26-28 June 1984
[AD-A169867] N87-15192
STATIC PRESSURE
Transition detection using surface pressure holes N87-15170
STATISTICAL ANALYSIS
PPM/NAR 8.4-GHz noise temperature statistics for DSN 64-meter antennas, 1982-1984 N87-15350
Effects of regional-scale diurnal variations on the radiation balance of the Earth-atmosphere system N87-15634
Estimation of global, direct and diffuse radiation from satellite images by statistical methods N87-15639
Technology Reports of the Osaka University, volume 36, nos. 1844-1864
[ISSN-0030-6177] N87-15754
STATISTICAL DISTRIBUTIONS
The characteristics of the second-order target model
[RAE-TR-85071] N87-15752
STATISTICAL WEATHER FORECASTING
The initialization and use of prognostic land-surface values in the French operational forecast system — weather forecasting N87-15553
STEELS
Electrochemical reactions with bare metal surfaces and corrosion fatigue crack growth
[AD-A172248] N87-15297
STELLAR ATMOSPHERES
Rediscussion of the model atmosphere of Vega N87-15842
Automatic parameterization and analysis of stellar atmospheres: A study of the DA white dwarfs N87-15918
STELLAR EVOLUTION
The transformation from planetary nebula nucleus to white dwarf: A seismological study of stellar metamorphosis N87-15919
STELLAR MAGNETIC FIELDS
Magnetic fields of hot stars: Observation methods and results N87-15800
Physics of pulsar magnetosphere N87-15844
Quantum effects in synchronization radiation of a plasma in superstrong magnetic fields of neutron stars N87-15846
Two-photon annihilation radiation in strong magnetic field — pulsars N87-15847
Bound electron-positron pair creation by gamma-quanta in superstrong magnetic field of pulsars N87-15848
The generation of radio waves in the inhomogeneous magnetic field of the pulsar magnetosphere N87-15849
Gamma-positronium in the magnetosphere of a pulsar N87-15852
Pulsar electrodynamics: Magnetospheres and radiation by magnetospheric plasma N87-15855
On the effect of differential rotation on axisymmetric and nonaxisymmetric magnetic fields of cosmic bodies N87-15876
STELLAR MASS ACCRETION
Accreting pulsars: Some recent theoretical results N87-15857
STELLAR MODELS
Rediscussion of the model atmosphere of Vega N87-15842
Physics of pulsar magnetosphere N87-15844
Pairs of pulsars in the diagram P dot versus P N87-15856
Accreting pulsars: Some recent theoretical results N87-15857
Model of bimodal behavior of Cygnus X-1 N87-15875
STELLAR RADIATION
Magnetic fields of hot stars: Observation methods and results N87-15800
Radiation transfer and radiation pressure on plasma by magnetic degenerates — stellar radiation N87-15845
Two-photon annihilation radiation in strong magnetic field — pulsars N87-15847
Electrodynamics of inhomogeneous relativistic electron-positron plasma and radio emission of pulsars N87-15850
Pulsar electrodynamics: Magnetospheres and radiation by magnetospheric plasma N87-15855
Accreting pulsars: Some recent theoretical results N87-15857
STELLAR STRUCTURE
Helioseismology and the internal structure of the Sun N87-15807
STEREOPHOTOGRAPHY
Status of launch vehicle, satellite and mission related activities for MEOSS — Mono Electro-Optical Stereo Scanner (MEOSS) N87-15244
Presentation of the status of the experiment Monocular Electro-Optical Stereo Scanner (MEOSS) N87-15245
STEREOSCOPIC VISION
Effects of extended camera baseline and image magnification on target detection time and target recognition with a stereoscopic TV system
[AD-A171063] N87-15398
STIFFNESS
Theoretical and experimental analysis of multidirectionally-braided composites
[AD-A172694] N87-15281
STIMULATION
A theoretical study of the electromagnetic fields in a limb, excited by artificial sources
[EUT-86-E-156] N87-15694
STOCHASTIC PROCESSES
Investigation of the UHF mobile-radio propagation channel in a temperate-zone forested environment
[AD-A171431] N87-15403
Methods of multiple access communications with energy detectors
[AD-A172757] N87-15409
The stationary autogressive model
[AD-A171416] N87-15753
Stochastization of charged particle motion near a magnetic field reversal and the problem of explosive reconnection — magnetotail N87-15823
STOICHIOMETRY
The barium iron ruthenium oxide system
[NASA-TM-88451] N87-15264
Fluorometric method for the determination of gas-phase hydrogen peroxide N87-15541
STORAGE STABILITY
Surveillance report, Stage 1: Dissected Motor/Propellant Motor Number 0012029
[AD-A171132] N87-15274
STRAIN ENERGY METHODS
Simple formulas for strain-energy release rates with higher order and singular finite elements
[NASA-CR-178186] N87-15490
STRAIN HARDENING
Shear localization in rate and temperature dependent solids N87-15477
STRAIN RATE
An endochronic rate-sensitive constitutive equation for metals: Application to generalized creep
[AD-A172705] N87-15298
Shear localization in rate and temperature dependent solids N87-15477
Analyses of stresses and strains N87-15483

Strain accumulation and surface deformation along the San Andreas, California
[NASA-CR-180058] N87-15657

STRATOSPHERE
Water vapor profiles for Washington, D.C.; Boulder, Colorado; Palestine, Texas; Laramie, Wyoming and Fairbanks, Alaska during the period 1974 to 1985: Data report
[PB86-234622] N87-15675

STRESS (PHYSIOLOGY)
Exploratory study of the potential effects of exposure to sonic boom on human health. Volume 2: Epidemiological study
[AD-A170953] N87-15686
Models of cerebral system mechanics
[AD-A171483] N87-15692

STRESS ANALYSIS
Failure analysis of composite structure materials
[AD-A172238] N87-15279
New approach for calibration and interpretation of IRAD GAGE vibrating-wire stressmeters
[DE86-010975] N87-15455
Analyses of stresses and strains N87-15483
Creep fatigue life prediction for engine hot section materials (ISOTROPIC)
[NASA-CR-179550] N87-15491
Stress in a bonded wafer
[AD-A171056] N87-15493
Studies of stress and deformation in the Earth's crust: Part 1: Determining the state of stress in the Earth from earthquake focal mechanism data. Part 2: Deformation around the Creede Caldera, San Juan volcanic field, southwest Colorado: Implications for Caldera mechanics N87-15527
Strain accumulation and surface deformation along the San Andreas, California
[NASA-CR-180058] N87-15657
Optimization of continuum structures using a boundary element formulation N87-15705

STRESS CONCENTRATION
Stress in a bonded wafer
[AD-A171056] N87-15493
Mechanics of shear rupture applied to earthquake zones
[NASA-CR-180070] N87-15663

STRESS CORROSION CRACKING
Corrosion and stress corrosion of steel pressure boundary components and steam turbines
[DE86-780555] N87-15293

STRESS MEASUREMENT
New approach for calibration and interpretation of IRAD GAGE vibrating-wire stressmeters
[DE86-010975] N87-15455

STRESS-STRAIN DIAGRAMS
Analyses of stresses and strains N87-15483

STRESS-STRAIN RELATIONSHIPS
The effects of implanted delaminations on the tensile strength of graphite/epoxy laminates
[AD-A171329] N87-15278
An endochronic rate-sensitive constitutive equation for metals: Application to generalized creep
[AD-A172705] N87-15298
High temperature monotonic and cyclic deformation in a directionally solidified nickel-base superalloy
[NASA-CR-175101] N87-15303
Analyses of stresses and strains N87-15483
Durability of structural adhesively bonded systems
[AD-A170708] N87-15492
On cavitation and residual creep life N87-15758

STRESSES
Effects of stress on the ultrasonic response of fatigue cracks
[AERE-R-10854] N87-15497

STRING THEORY
Nonlinear partial differential equations and related problems of pade approximations
[AD-A172253] N87-15748

STRUCTURAL ANALYSIS
Seat experiment results of full-scale transport aircraft controlled impact demonstration
[AD-A172245] N87-15193
An interdisciplinary approach to predictive modeling of structural adhesive bonding. Characterization of Ti-6Al-4V oxides and the adhesive/oxide interphase
[AD-A172313] N87-15312
Structural-mechanics behavior of insulating glass units
[PB86-234614] N87-15316
Replicas and structural analysis: Criteria for the reliability of creep-loaded installations N87-15484
Structure as a criterion for high temperature ductility N87-15485
Durability of structural adhesively bonded systems
[AD-A170708] N87-15492
Optimization of continuum structures using a boundary element formulation N87-15705
An analysis method of strongly connected structure based on fundamental cycles N87-15761

STRUCTURAL DESIGN CRITERIA
Space station experiment definition: Advanced power system test bed
[NASA-CR-179502] N87-15270
Replicas and structural analysis: Criteria for the reliability of creep-loaded installations N87-15484
Structure as a criterion for high temperature ductility N87-15485

STRUCTURAL MEMBERS
Small, self-contained aircraft fatigue data recorder
[AD-A172400] N87-15207

STRUCTURAL PROPERTIES (GEOLOGY)
Studies of stress and deformation in the Earth's crust: Part 1: Determining the state of stress in the Earth from earthquake focal mechanism data. Part 2: Deformation around the Creede Caldera, San Juan volcanic field, southwest Colorado: Implications for Caldera mechanics N87-15527
Unstable deformation in layered media: Application to planetary lithospheres N87-15925

SUBSONIC FLOW
Viscous analyses for flow through subsonic and supersonic intakes
[NASA-TM-88831] N87-15173
Efficient solutions to the Euler equations for supersonic flow with embedded subsonic regions
[NASA-TP-2523] N87-15183

SUBSONIC SPEED
Subsonic maneuver capability of a supersonic cruise fighter wing concept
[NASA-TP-2642] N87-15184

SUBSTRATES
Study of the kinetics of catalytic decomposition of hydrazine vapors on palladium
[NASA-TM-88549] N87-15286
Adhesion, friction, and deformation of ion-beam-deposited boron nitride films
[NASA-TM-88902] N87-15305
Rugged, thin GaAs solar cell development, phase 1
[AD-A171188] N87-15520

SUDAN
Desertification monitoring: Remotely sensed data for drought impact studies in the Sudan N87-15604
Toward a drought-oriented climatic prediction system in Western Sudan N87-15606
Surface albedo change in arid regions in the Sudan N87-15615

SULFUR COMPOUNDS
Transmission electron microscope and photoluminescence studies of ZnS crystalline films grown by low-pressure MOCVD N87-15766
Effects of phosphoric acid on the lead-acid battery reactions N87-15772

SUNSPOTS
Oscillations and waves in sunspots N87-15805

SUPERCONDUCTING MAGNETS
Application of superconducting magnet energy storage to power system stabilizing control N87-15762

SUPERCONDUCTIVITY
Output energy in pulsars N87-15853

SUPERCONDUCTORS
Development of NbN Josephson junction technology
[AD-A171067] N87-15885
Josephson effect detectors of microwave and far infrared radiation
[AD-A171539] N87-15889

SUPERGIANT STARS
Seeing effects and their calibration for astronomical speckle interferometry N87-15914

SUPERGRAVITY
Spontaneous compactification of extra dimensions in eleven-dimensional quantum gravity
[DE86-702620] N87-15895

SUPERHIGH FREQUENCIES
Relative performance of 8.5-GHz and 32-GHz telemetry links on the basis of total data return per pass N87-15337
Long-term amplitude and phase stability of the 400-kW 2.115-GHz transmitter N87-15338
X-band uplink feedcone capabilities, components, and layout N87-15344

SUPERLATTICES
Tailorable infrared sensing device with strain layer superlattice structure
[NASA-CASE-NPO-16607-1] N87-15883

SUPERNOVA REMNANTS
Laboratory simulation of collisionless coupling between supernova remnants and magnetized interstellar medium N87-15798

SUPERNOVAE
Very hot interstellar matter heated by a galactic shock wave N87-15828
Cosmic ray archaeology, solar activity and supernova explosions N87-15831
The role of cosmic rays in supernovae shock dynamics N87-15832
Injection mechanism for the cosmic ray acceleration by shocks N87-15835

SUPERROTATION
Plasma outflow and superrotation in the Jovian magnetosphere deduced from Voyager observations N87-15924

SUPERSONIC COMBUSTION
Pressure interactions in supersonic combustion
[AD-A172711] N87-15289

SUPERSONIC CRUISE AIRCRAFT RESEARCH
Subsonic maneuver capability of a supersonic cruise fighter wing concept
[NASA-TP-2642] N87-15184

SUPERSONIC FLOW
Viscous analyses for flow through subsonic and supersonic intakes
[NASA-TM-88831] N87-15173
Efficient solutions to the Euler equations for supersonic flow with embedded subsonic regions
[NASA-TP-2523] N87-15183
A simple concept for the computation of steady supersonic flow with supply of heat N87-15224
Problems of the compensation calculation for the interferometry of spatial flows N87-15228
Pressure interactions in supersonic combustion
[AD-A172711] N87-15289
Supersonic flow over cylindrical afterbodies with base bleed
[AD-A171461] N87-15448
Radiation of ion-acoustic waves by supersonic soliton N87-15868

SUPERSONIC INLETS
Viscous analyses for flow through subsonic and supersonic intakes
[NASA-TM-88831] N87-15173

SUPERSONIC SPEED
Drag predictions for projectiles at transonic and supersonic speeds
[AD-A171462] N87-15191

SUPERSYMMETRY
Topics in cosmology and particle physics
[DE86-014830] N87-15923

SUPPORT SYSTEMS
Giotto mission support N87-15353

SUPPRESSORS
Signal processing in ultrasonic NDE (nondestructive evaluation)
[AD-A172687] N87-15475

SURFACE CRACKS
Ultrasonic scattering and nondestructive evaluation of defects
[AD-A172258] N87-15494

SURFACE DEFECTS
Ultrasonic scattering and nondestructive evaluation of defects
[AD-A172258] N87-15494

SURFACE NAVIGATION
Map data requirement for civil land vehicle navigation and location synopsis N87-15511

SURFACE PROPERTIES
African drought: An example of the influence of land-surface properties on climate N87-15602

SURFACE REACTIONS
Seventh International Summer Institute in Surface Science
[AD-A171449] N87-15287
Measuring and modeling solar irradiance on vertical surfaces
[DE86-010737] N87-15668

SURFACE ROUGHNESS
Investigation of the conditions for tripping transition with roughness elements and their influence on boundary layer development N87-15168
Parameterization of albedo, thermal inertia, and surface roughness of desert scrub/sandy soil surface N87-15557
Emissivity as a function of surface roughness: A computer model
[AD-A172230] N87-15790

SURFACE ROUGHNESS EFFECTS
Development of an artificial boundary layer for different outlet flows N87-15167
Issues concerning the evaluation of effective surface roughness of heterogeneous terrain N87-15556

SURFACE TEMPERATURE
Parameterization of albedo, thermal inertia, and surface roughness of desert scrub/sandy soil surface N87-15557
Remote sensing of land-surface temperature from HIRS/MSU data — High Resolution Infrared Sounder/Microwave Sounding Unit (HIRS/MSU) N87-15573
Surface temperature from AVHRR and TOVS from the meteorological satellite NOAA 9 N87-15574

Estimation of regional evaporation using midday surface temperature from satellite thermal IR data N87-15591
Vegetation index and surface temperature in a mesoscale climate model — Alps N87-15592
Derivation of surface properties from satellite observations N87-15642
Measurements and estimations of the energy balance and surface temperature of the Dischma Valley (Switzerland) N87-15650

SURFACE VEHICLES
Adaptive modeling of the dynamics of autonomous land vehicles
[AD-A172404] N87-15911

SURVEYS
Inertial surveying and the collection of data base information — road maps N87-15500

SWEPT WINGS
Applicability of linearized-theory attached-flow methods to design and analysis of flap systems at low speeds for thin swept wings with sharp leading edges
[NASA-TP-2653] N87-15174

SWITCHING CIRCUITS
Delay modeling of bipolar ECL/EFL (Emitter-Coupled Logic/Emitter-Follower-Logic) circuits
[AD-A171131] N87-15424

SWITZERLAND
Computer-assisted construction of a structural atlas of Switzerland N87-15499

SYMBOLS
A rewrite rule machine. Programming by generic example
[AD-A171074] N87-15726

SYNCHRONISM
A synchronization technique for optical PPM signals N87-15332

SYNCHROTRON RADIATION
Quantum effects in synchronization radiation of a plasma in superstrong magnetic fields of neutron stars N87-15846

SYNTAX
Syntax directed editing of LeLISP. Annexe D1.A3 of deliverable D1 - second review N87-15711
User definable syntax for specification languages. Annexe D4.A1 of deliverable D4 — programming languages N87-15717

SYNTHESIS (CHEMISTRY)
Preparation of B-Trichloroborazine
[NASA-CASE-ARC-11643-1-SB] N87-15275
The barium iron ruthenium oxide system
[NASA-TM-88451] N87-15284
Condensation polymers with controlled structure
[AD-A172283] N87-15311
Study of nickel hydroxide electrodes. 2: Oxidation products of nickel (2) hydroxides
[NASA-TM-88473] N87-15416

SYSTEMS ANALYSIS
Viscous analyses for flow through subsonic and supersonic intakes
[NASA-TM-88831] N87-15173
Systems approach to quantify desertifications processes using LANDSAT-MSS data N87-15613
Theoretical analysis of segmented Wolter/LSM X-ray telescope systems
[NASA-CR-178986] N87-15915

SYSTEMS ENGINEERING
Handbook. Volume 1: Validation of digital systems in avionics and flight control applications
[DOT/FAA/CT-82/115-VOL-1-REV] N87-15204
Interdisciplinary and multilevel optimum design
[NASA-TM-89077] N87-15205
Proceedings of an ESA Workshop on Land Mobile Services by Satellite
[ESA-SP-259] N87-15361
PRODAT system architecture — communication network N87-15371
Implementation of a land mobile terminal for satellite data communication N87-15374
Advanced regional mobile satellite system for the nineties N87-15375
Robot system for dexterous tasks (for space applications)
[ETN-86-98562] N87-15472
Systems approach to quantify desertifications processes using LANDSAT-MSS data N87-15613
An investigation of expert systems usage for software requirements development in the strategic defense initiative environment
[AD-A169659] N87-15724

SYSTEMS INTEGRATION
Interdisciplinary and multilevel optimum design
[NASA-TM-89077] N87-15205

SYSTEMS MANAGEMENT
Planning and control of map production and reproduction using computers N87-15505

SYSTEMS SIMULATION
Transition fixing and simulation of high Reynolds number flow at transonic velocities N87-15169

SYSTOLIC ARRAYS
Systolic VLSI for Kalman filters N87-15360

T

TABLES (DATA)
Table look-up estimation of signal and noise parameters from quantized observables N87-15341

TAKEOFF
Boundary layer transition control for takeoff and landing configurations N87-15162

TANKS (COMBAT VEHICLES)
Development of referee fuels for improved Army multifuel engine design
[AD-A171143] N87-15318

TAPES
High intensity casting system
[NASA-CASE-NPO-16901-1-CU] N87-15327

TARGET ACQUISITION
Stationary/slowly moving target detection in strong background clutter
[AD-A172225] N87-15406

TARGET RECOGNITION
Effects of extended camera baseline and image magnification on target detection time and target recognition with a stereoscopic TV system
[AD-A171063] N87-15398
Stationary/slowly moving target detection in strong background clutter
[AD-A172225] N87-15406
Spatial scale in image detection and recognition
[AD-A171348] N87-15691

TASKS
Use of disjunctive response requirements in dual-task environments: Implications for automation
[AD-A171277] N87-15702

TAURUS CONSTELLATION
A spectral analysis of RV Tauri variables N87-15912

TDR SATELLITES
Space Shuttle/TDRSS communication and tracking systems analysis
[NASA-CR-171948] N87-15391

TEARING MODES (PLASMAS)
Merging instability of magnetic islands N87-15810

TECHNOLOGICAL FORECASTING
Land mobile communications satellite missions in Europe N87-15362

TECHNOLOGY ASSESSMENT
Studies and analyses of the Space Shuttle Main Engine: SSME failure data review, diagnostic survey and SSME diagnostic evaluation
[NASA-CR-178993] N87-15268
Land mobile communications satellite N87-15363
Economic and market aspects of land mobile satellite compared to terrestrial cellular radio N87-15365
Current status and expected developments in the area of satellite communications in the Latin American and Caribbean region
[NASA-TM-88000] N87-15395
Assessment of creep loaded high temperature installations N87-15481
The prospects for hydrological measurements using ERS-1 — lakes N87-15588

TECHNOLOGY TRANSFER
Subject categorization guide for defense science and technology
[AD-A172650] N87-15903

TECHNOLOGY UTILIZATION
Technology for large space systems: A bibliography with indexes (supplement 15)
[NASA-SP-7046(15)] N87-15239
Communication by satellites for truck systems N87-15366
Data gathering: Cost/time considerations — cartography N87-15509
Problems in the application of thermal images in urban climatology N87-15649

TELECOMMUNICATION
The Telecommunications and Data Acquisition Report
[NASA-CR-179938] N87-15329
Current status and expected developments in the area of satellite communications in the Latin American and Caribbean region
[NASA-TM-88000] N87-15395

TELEMETRY
ISRO telemetry, tracking and command network (ISTRA) N87-15249
Software development for the VLA-GDSCC telemetry array project N87-15348
Real-time combiner loss N87-15349

TELEPHONY
Advanced regional mobile satellite system for the nineties N87-15375

TELESCOPES
A cost-performance model for ground-based optical communications receiving telescopes N87-15336

TELEVISION SYSTEMS
Large TV display system
[NASA-CASE-NPO-16932-1] N87-15413

TEMPERATE REGIONS
Climatic effect of snowfall anomaly in mid-high latitudes in a one-dimensional air-land model N87-15567

TEMPERATURE
Verification of mesoscale objective analyses of VAS and rawinsonde data using the March 1982 AVE/VAS special network data
[NASA-CR-179988] N87-15670

TEMPERATURE DEPENDENCE
Shear localization in rate and temperature dependent solids N87-15477

TEMPERATURE DISTRIBUTION
Soviet research on the transport of intense relativistic electron beams through low-pressure air
[AD-A172274] N87-15783

TEMPERATURE EFFECTS
High temperature monotonic and cyclic deformation in a directionally solidified nickel-base superalloy
[NASA-CR-175101] N87-15303
Process for curing bismaleimide resins
[NASA-CASE-ARC-11429-4] N87-15304
FEM model of 3D transient temperature and stress fields in welded plates N87-15476
Lageos orbit decay due to infrared radiation from Earth
[NASA-TM-87804] N87-15685
On cavitation and residual creep life N87-15758
Harmonic conversion of GEKKO 12 high-power Nd:glass laser N87-15767

TEMPERATURE GRADIENTS
Lageos orbit decay due to infrared radiation from Earth
[NASA-TM-87804] N87-15685
Revision of the theory of gradient solitons — plasma drift N87-15885

TEMPERATURE MEASUREMENT
Sonic anemometer surface heat flux measurements for validation of satellite observations N87-15599
Measurements and estimations of the energy balance and surface temperature of the Dischma Valley (Switzerland) N87-15650
Multiangle or multiwavelength technique for remote sensing of sea surface temperature N87-15652
The two state structure of the solar wind and its influence upon proton temperatures in the inner heliosphere. Observations of Helios 1 and Helios 2 N87-15929

TENSILE PROPERTIES
Tensile behavior of helium-implanted and neutron-irradiated V-15Cr-5Ti
[DE86-007301] N87-15292

TENSILE STRENGTH
The effects of implanted delaminations on the tensile strength of graphite/epoxy laminates
[AD-A171329] N87-15278

TENSORS
Spontaneous compactification of extra dimensions in eleven-dimensional quantum gravity
[DE86-702620] N87-15895

TERMINAL GUIDANCE
Maximum-terminal-velocity guidance for a hypersonic glider N87-15202

TERMINAL VELOCITY
Maximum-terminal-velocity guidance for a hypersonic glider N87-15202

TERNARY SYSTEMS
Preparation and characterization of several 2-4-V2 stannite single crystals
[AD-A172238] N87-15890

TERRESTRIAL RADIATION
Two years of the International Satellite Land-Surface Climatology Project (ISLSCP) N87-15545
Radiation and clouds: A summary of international and national activities N87-15631
Effects of regional-scale diurnal variations on the radiation balance of the Earth-atmosphere system N87-15634
Global and atmospheric radiation at ground from satellite data N87-15637
Estimation of global, direct and diffuse radiation from satellite images by statistical methods N87-15639
The effect of viewing aspect on climatological cloud distribution
[AD-A170440] N87-15672
Magnetospheric and solar radiation from loss-cone driven test instabilities N87-15839

TEST FIRING
Breadboard RL10-11B low thrust operating mode [NASA-CR-174914] N87-15269
TEST STANDS
Experimental short-duration techniques — gas turbine engine tests N87-15209
TETHERED BALLOONS
Tethered balloon measurements at San Nicolas Island (October 1984): Instrumentation, data summary, preliminary data interpretation [AD-A172226] N87-15674
THAILAND
The application of LANDSAT imagery for land cover assessment — Thailand N87-15614
THEMATIC MAPPING
Contributions to geodesy, photogrammetry, and cartography, series 2, no. 44 — conference [ISSN-0469-4244] N87-15498
Transformation of the logic of a thematic map construction model to a user interface in automated cartography N87-15501
Mass digitization: The old way. Experiences with a manual digitizing system — cartography N87-15503
Computer-aided production of thematic maps for traffic data N87-15504
Problems of digital automated mapping N87-15506
Mapping of agricultural lands in the USSR N87-15507
Variations in in-flight absolute radiometric calibration — satellite remote sensors N87-15594
Vegetation identification and variability in the Tahoua area, Nigeria — LANDSAT thematic mapper N87-15610
Monitoring of land-surface change in Sri Lanka N87-15618
Group Agromet Monitoring Project (GAMP) methodology integrated mapping of rainfall, evapotranspiration, germination, biomass development and thermal inertia, based on Meteosat and conventional meteorological data N87-15626
Mountain building processes in the Central Andes [NASA-CR-180069] N87-15661
THEOREMS
Large deviation local limit theorems for random vectors [AD-A171176] N87-15746
THERMAL ANALYSIS
Thermal analysis and design of a cooling system for a Mach 14 nozzle [NASA-CR-180098] N87-15271
FEM model of 3D transient temperature and stress fields in welded plates N87-15476
THERMAL CONDUCTIVITY
Aging of polyurethane foams, the influence of gas diffusion on thermal conductivity [DE86-014339] N87-15314
An 1 sup (p) theory for the n-dimensional, stationary, compressible, Navier-Stokes equations, and the incompressible limit for compressible fluids. The equilibrium solutions [AD-A172778] N87-15451
THERMAL EXPANSION
Stress in a bonded wafer [AD-A171056] N87-15493
THERMAL INSULATION
Structural-mechanics behavior of insulating glass units [PB86-234814] N87-15316
THERMAL MAPPING
Problems in the application of thermal images in urban climatology N87-15649
THERMAL STABILITY
Group Agromet Monitoring Project (GAMP) methodology integrated mapping of rainfall, evapotranspiration, germination, biomass development and thermal inertia, based on Meteosat and conventional meteorological data N87-15626
THERMODYNAMIC EQUILIBRIUM
Single-substance, two-phase duct flow: A unified theoretical and experimental study N87-15438
Deviation from local thermodynamic equilibrium in a cesium-seeded argon plasma [EUT-85-E-152] N87-15881
THERMODYNAMIC PROPERTIES
Surveillance report. Stage 1: Dissected Motor/Propellant Motor Number 0012029 [AD-A171132] N87-15274
Inelastic gas-surface scattering. Part 2: Results [AD-A171587] N87-15780
THERMODYNAMICS
A model for predicting thermomechanical response of large space structures [AD-A172966] N87-15264
Shear localization in rate and temperature dependent solids N87-15477
Statistical mechanics of one-dimensional systems. 4: Generalization of the hard-core repulsion in multicomponent gases N87-15755
THERMOMAGNETIC EFFECTS
Magnetic field generation in celestial objects N87-15872
THERMOSETTING RESINS
The use of microdielectrometry in monitoring the cure of carbon-epoxy prepreg [AD-A172304] N87-15280
Dielectric analysis of the cure of thermosetting epoxy/amine systems [AD-A171274] N87-15308
THERMOSPHERE
Thermosphere structure variations during high solar and magnetic activity conditions [AD-A171350] N87-15666
THIN FILMS
Adhesion, friction, and deformation of ion-beam-deposited boron nitride films [NASA-TM-88902] N87-15305
High intensity casting system [NASA-CASE-NPO-16901-1-CU] N87-15327
THIN PLATES
Real time optimization of thin plate TIG arc welding N87-15759
THIN WINGS
Applicability of linearized-theory attached-flow methods to design and analysis of flap systems at low speeds for thin swept wings with sharp leading edges [NASA-TP-2653] N87-15174
THREE DIMENSIONAL FLOW
AGARD Fluid Dynamics Panel Symposium on Applications of Computational Fluid Dynamics in Aeronautics: Proceedings [NASA-TM-88356] N87-15181
Two- and three-dimensional viscous computations of a hypersonic inlet flow [NASA-TM-88923] N87-15441
Conservative boundary conditions for 3D gas dynamics problems [NASA-TM-88487] N87-15444
THREE DIMENSIONAL MOTION
Minimum points and views for the recovery of 3-dimensional structure [AD-A171148] N87-15696
THRUST AUGMENTATION
An experimental investigation of a circular thrust augmenting ejector [AD-A172376] N87-15231
THRUST CHAMBERS
Interactions of coupled acoustic and vortical instabilities in rocket combustion chambers N87-15266
THYRATRONS
Copper vapor lasers for isotope separation N87-15768
TIDES
Effects of the oceans on polar motion: Extended investigations [NASA-CR-179986] N87-15676
Effects of the oceans on polar motion: Extended investigations [NASA-CR-180066] N87-15677
TIME DEPENDENCE
An evaluation of descent strategies for TNAV-equipped aircraft in an advanced metering environment [NASA-CR-178093] N87-15197
Time dependent behavior of interstellar maser features due to stimulated scattering through dense plasma clouds N87-15838
TIME OF FLIGHT SPECTROMETERS
Vacuum ultraviolet photochemistry [DE86-015768] N87-15282
TIME OPTIMAL CONTROL
Formulation and minimality of nonlinear discrete time control systems N87-15233
TIME SERIES ANALYSIS
The stationary autogressive model [AD-A171416] N87-15753
TIME SIGNALS
Longwave propagation: A brief review [AD-A171147] N87-15400
TISSUES (BIOLOGY)
Development of N(2) sensor for determination of PN(2) in body tissues [AD-A171330] N87-15690
TITAN
Chemistry of the outer planets: Investigations of the chemical nature of the atmosphere of Titan [NASA-CR-180072] N87-15927
TITANIUM ALLOYS
An interdisciplinary approach to predictive modeling of structural adhesive bonding. Characterization of Ti-6Al-4V oxides and the adhesive/oxide interphase [AD-A172313] N87-15312
Fatigue crack propagation and fracture toughness of plasma arc welded Ti-6Al-4V alloy [RAE-TR-85066] N87-15478
TOLERANCES (PHYSIOLOGY)
Seat experiment results of full-scale transport aircraft controlled impact demonstration [AD-A172245] N87-15193
Inhalation toxicology. Part 7: Times to incapacitation and death for rats exposed continuously to atmospheric acrolein vapor [AD-A169666] N87-15680
G-tolerance standards for aircrew training and selection [AD-A170441] N87-15685
Noise susceptibility: A comparison of two Naval aviator populations [AD-A172222] N87-15693
TOPOGRAPHY
The differing requirements of producers and users of data and the design of topographic/cartographic databases N87-15502
A digital raster procedure for updating a topographic map N87-15512
TOPOLOGY
Topological stability of magnetic fields in spatial domains with boundaries and finite-length field lines N87-15812
TORQUE
The wrap up problem of the galactic magnetic field N87-15870
TOXIC HAZARDS
Two Phase Flows in Major Technological Hazards, volume 1 — conference [VKI-LS-1986-03-VOL-1] N87-15321
Overview of major hazards research. Part 1: Of risk and all that — chemical and petrochemical industries N87-15322
TOXICITY
Inhalation toxicology. Part 7: Times to incapacitation and death for rats exposed continuously to atmospheric acrolein vapor [AD-A169666] N87-15680
TRACE ELEMENTS
Ultrasensitive detection of atmospheric trace gases using frequency modulation spectroscopy N87-15535
TRACKING FILTERS
The characteristics of the second-order target model [RAE-TR-85071] N87-15752
TRAFFIC
Computer-aided production of thematic maps for traffic data N87-15504
TRAILING EDGE FLAPS
Low-speed aerodynamic characteristics of a wing-canard configuration with underwing spanwise blowing on the trailing-edge flap system [NASA-TM-89020] N87-15180
TRAJECTORY ANALYSIS
Maximum-terminal-velocity guidance for a hypersonic glider N87-15202
The characteristics of the second-order target model [RAE-TR-85071] N87-15752
TRAJECTORY CONTROL
Maximum-terminal-velocity guidance for a hypersonic glider N87-15202
TRANSATMOSPHERIC VEHICLES
NASA authorizations, fiscal year 1987 [GPO-61-975] N87-15904
TRANSDUCERS
Signal processing in ultrasonic NDE (nondestructive evaluation) [AD-A172687] N87-15475
Ultrasonic measurements research: Improved acoustic emission methods [AD-A172726] N87-15778
Nonlinear optical apparatus using optical fibers [AD-D012439] N87-15787
TRANSIENT RESPONSE
Basic equations and solution method for the calculation of the transient electromechanical response of dielectric devices [DE86-012728] N87-15436
TRANSISTOR AMPLIFIERS
Amplification of electrical signals with molecule-based transistors: Power amplification up to a kilohertz frequency and factors limiting higher frequency operation [AD-A172709] N87-15434
TRANSISTORS
PH sensitive WO3-Based microelectrochemical transistors [AD-A172563] N87-15432
Modification of microelectrode arrays: New microelectrochemical devices for sensor applications [AD-A171180] N87-15454
TRANSITION FLOW
Boundary layer control by transition fixing [ESA-TT-909] N87-15160

Investigation of the conditions for tripping transition with roughness elements and their influence on boundary layer development N87-15168
Transition fixing and simulation of high Reynolds number flow at transonic velocities N87-15169
Investigation of the experimental detection of boundary layer transition N87-15171

TRANSMISSION EFFICIENCY
Methods of multiple access communications with energy detectors
[AD-A172757] N87-15409

TRANSMISSION LINES
Printed circuit card hybrid
[AD-D012448] N87-15428

TRANSMISSION LOSS
Real-time combiner loss N87-15349

TRANSMITTER RECEIVERS
Aircraft collision warning system
[AD-D012463] N87-15199
Implementation of a land mobile terminal for satellite data communication N87-15374

TRANSMITTERS
Long-term amplitude and phase stability of the 400-kW 2.115-GHz transmitter N87-15338

TRANSONIC FLIGHT
Experiences with transition fixing in the high speed regime at NLR, Netherlands N87-15163

TRANSONIC FLOW
The influence of transition strips on the pressure distribution on transonic profiles N87-15166
Transition fixing and simulation of high Reynolds number flow at transonic velocities N87-15169
An efficient algorithm for solution of the unsteady transonic small-disturbance equation
[NASA-TM-89014] N87-15176
TRANDESNF: A computer program for transonic airfoil design and analysis in nonuniform flow
[NASA-CR-4044] N87-15186
Canard/Tail transonic analysis
[AD-A171075] N87-15189
Drag predictions for projectiles at transonic and supersonic speeds
[AD-A171462] N87-15191
Unsteady aerodynamic and heat transfer processes in a transonic turbine stage N87-15220
Procedure for computing transonic flows for control of adaptive wind tunnels
[NASA-TM-88530] N87-15235

TRANSONIC SPEED
Drag predictions for projectiles at transonic and supersonic speeds
[AD-A171462] N87-15191

TRANSONIC WIND TUNNELS
A simplified fourwall interference assessment procedure for airfoil data obtained in the Langley 0.3-meter transonic cryogenic tunnel
[NASA-CR-4042] N87-15187
Procedure for computing transonic flows for control of adaptive wind tunnels
[NASA-TM-88530] N87-15235

TRANSPONDERS
Air traffic control radar beacon system transponder performance study and analysis. Vol. 1: Transponder test methodology results, analysis and recommendations
[DOT/FAA/FS-86/1.1-VOL-1] N87-15198

TRANSPORT AIRCRAFT
Experiences with transition fixing in the high speed regime at NLR, Netherlands N87-15163
Seat experiment results of full-scale transport aircraft controlled impact demonstration
[AD-A172245] N87-15193
Task force on emergency evacuation of transport airplanes. Volume 2: Supporting documentation
[AD-A172256] N87-15194

TRANSPORT PROPERTIES
An assessment of transport coefficient approximations used in galactic heavy ion shielding calculations
[NASA-TM-89054] N87-15782

TRANSPORT THEORY
Space applications of basic plasma theory N87-15248

TRANSPORTATION NETWORKS
VECOM: A powerful local communication channel between vehicle-borne and roadside systems N87-15367
Economic aspects of communication in road transport N87-15368
Data transmission: A key factor to the efficiency of the transport industry N87-15369

TRAVELING SALESMAN PROBLEM
Artificial intelligence through evolutionary programming: Prediction and identification
[AD-A171544] N87-15741

TRAVELING WAVE MASERS
Block 2A traveling-wave maser N87-15346

TREES (MATHEMATICS)
The virtual tree processor. Deliverable D2.A2 of task T2 N87-15715
Randomized routing on fat trees
[AD-A171546] N87-15738

TROPICAL REGIONS
Canopy reflectance modeling in a tropical wooded grassland
[NASA-CR-180097] N87-15518
Importance of the tropical rain forest as an atmospheric moisture source N87-15606

TROPOSPHERE
Field test to intercompare carbon monoxide, nitric oxide and hydroxyl instrumentation at Wallops Island, Virginia
[NASA-TM-87718] N87-15524
Future directions for H sub x O sub y detection
[NASA-CP-2448] N87-15528
Future directions for H sub x O sub y detection, executive summary N87-15529
Tropospheric HO determination by FAGE N87-15532
Tropospheric HO2 determination by FAGE N87-15542
The correlation between the physico-chemical and optical properties of tropospheric aerosols with regard to the radiation budget (POETA) program N87-15647

TRUCKS
Communication by satellites for truck systems N87-15366
Low gain antennas for land-mobile terminals N87-15373
Implementation of a land mobile terminal for satellite data communication N87-15374

TRUSSES
Mobile remote manipulator system for a tetrahedral truss
[NASA-CASE-MSC-20985-1] N87-15260
Dynamic testing of a two-dimensional box truss beam
[NASA-CR-4039] N87-15262

TUNABLE LASERS
Tunable-diode laser absorption spectrometry N87-15543

TUNGSTEN OXIDES
PH sensitive WO3-Based microelectrochemical transistors
[AD-A172563] N87-15432

TUNING
Tailorable infrared sensing device with strain layer superlattice structure
[NASA-CASE-NPO-16607-1] N87-15883

TURBIDITY
Estimation of atmospheric turbidity — satellite imagery N87-15645

TURBINE BLADES
Simulation codes for calculation of heat transfer to convectively-cooled turbine blades N87-15213
Simulating the effects of curvature, free stream turbulence, and transition — heat transfer on gas turbine blades N87-15215
Simulation codes for calculation of heat transfer to film-cooled turbine blades N87-15216
Experimental and theoretical approaches used at the National Aerospace Laboratory in Japan — turbine blade film cooling N87-15217
Hydrodynamics of film cooling — gas turbine blades N87-15219
The effect of wake passing on turbine blades N87-15221
The scaling of film cooling: Theoretical and experimental results — gas turbines N87-15222

TURBOFAN AIRCRAFT
The National Gas Turbine projects in Japan. The FJR-710 turbofan engine project. The ADTJ-100 high efficient gas turbine project N87-15218

TURBOGENERATORS
Radio frequency monitoring of turbine generators N87-15412

TURBOMACHINERY
Convective Heat Transfer and Film Cooling in TurboMachinery — conference
[VKI-LS-1986-06] N87-15208
Study of particulated flows and erosion in turbomachinery
[AD-A172965] N87-15232
Evaluation of seals for high-performance cryogenic turbomachines
[NASA-TM-88919] N87-15442

TURBORAMJET ENGINES
Comparison of turboengine, turborocket, and turbojet engine as propulsion for long range and high Mach numbers N87-15225
Integrated turboramjet-rocket performance potential: Project ITUSTRA — hybrid propulsion systems
[ICAS-DGLR-76-045] N87-15227

TURBOROCKET ENGINES
Comparison of turboengine, turborocket, and turbojet engine as propulsion for long range and high Mach numbers N87-15225
Integrated turboramjet-rocket performance potential: Project ITUSTRA — hybrid propulsion systems
[ICAS-DGLR-76-045] N87-15227

TURBULENCE EFFECTS
Simulating the effects of curvature, free stream turbulence, and transition — heat transfer on gas turbine blades N87-15215

TURBULENT BOUNDARY LAYER
Numerical solution of laminar and turbulent boundary layer equations including transition and experimental study of a flat plate with a blunt fin at incidence
[AD-A172409] N87-15450

TURBULENT FLOW
Pressure interactions in supersonic combustion
[AD-A172711] N87-15289
Application of Rayleigh scattering to turbulent flow with heat transfer and combustion
[AD-A172934] N87-15290
An experimental investigation of wall pressure fluctuations beneath non-equilibrium turbulent flows
[AD-A171508] N87-15449
Effects of the oceans on polar motion: Extended investigations
[NASA-CR-179986] N87-15676
Natural convection of stably stratified fluid layer with uniform heating from below N87-15771
Correlative properties of self-exciting fluctuative magnetic fields — solar and galactic magnetic fields N87-15874

TURBULENT HEAT TRANSFER
Simulating the effects of curvature, free stream turbulence, and transition — heat transfer on gas turbine blades N87-15215
Simulation codes for calculation of heat transfer to film-cooled turbine blades N87-15216

TURING MACHINES
Diagonalization methods in a polynomial setting
[FVI-86-10] N87-15750

TURKEY
Remote sensing activites in Turkey: Possible contributions to climate studies N87-15624

TWO DIMENSIONAL BODIES
Aerodynamic characteristics of two-dimensional wing configurations at angles of attack near -90 deg
[NASA-TM-88373] N87-15182
Dynamic testing of a two-dimensional box truss beam
[NASA-CR-4039] N87-15262
Distributed control in computer networks and cross-sections of colored multidimensional bodies
[AD-A172224] N87-15740

TWO DIMENSIONAL BOUNDARY LAYER
On the need to benchmark simulation codes — boundary layer flow N87-15214

TWO DIMENSIONAL FLOW
Direct calculation of wall interferences and wall adaptation for two-dimensional flow in wind tunnels with closed walls
[NASA-TM-88523] N87-15236
Simulation of two-dimensional internal incompressible separated flows with heat transfer N87-15439
Two- and three-dimensional viscous computations of a hypersonic inlet flow
[NASA-TM-88923] N87-15441
Vortical dissipation in two-dimensional shear flows
[NASA-TM-89408] N87-15445

TWO FLUID MODELS
The two state structure of the solar wind and its influence upon proton temperatures in the inner heliosphere. Observations of Helios 1 and Helios 2 N87-15929

TWO PHASE FLOW
Two Phase Flows in Major Technological Hazards, volume 1 — conference
[VKI-LS-1986-03-VOL-1] N87-15321
Single-substance, two-phase duct flow: A unified theoretical and experimental study N87-15438

U

U.S.S.R.
USSR Space Life Sciences Digest, issue 9
[NASA-CR-3922(10)] N87-15679
Implications of the strategic defense initiative for ABM treaty
[AD-A171145] N87-15909

U.S.S.R. SPACE PROGRAM
Pathfinder operations N87-15355
VEGA Pathfinder navigation for Giotto Halley encounter N87-15356
Selection of radio sources for Venus balloon-Pathfinder Delta-DOR navigation at 1.7 GHz N87-15357

ULTRAHIGH FREQUENCIES
X-band uplink feedcone capabilities, components, and layout N87-15344
L-band antennas for regional mobile communication satellites N87-15377
ULTRASONIC TESTS
Ultrasonic scattering and nondestructive evaluation of defects
[AD-A172258] N87-15494
ULTRASONICS
Ultrasonic backscatter and attenuation measurements for microstructure characterization: Application to consolidated rapidly solidified type 304 stainless steel powder
[DE86-014917] N87-15300
Signal processing in ultrasonic NDE (nondestructive evaluation)
[AD-A172687] N87-15475
Effects of stress on the ultrasonic response of fatigue cracks
[AERE-R-10854] N87-15497
Ultrasonic measurements research: Improved acoustic emission methods
[AD-A172726] N87-15778
ULTRAVIOLET LASERS
Photochemical ignition studies. Part 2: Oxygen-atom 2-photon resonance effects
[AD-A172974] N87-15463
UNDERWATER COMMUNICATION
Intense excitation source of blue-green laser
[AD-A172660] N87-15460
UNIFIED FIELD THEORY
Effective Einsteinian gravity from Poincare gauge field theory
[DE86-702674] N87-15897
UNITED STATES
Mobile aviation services in the 1545-1559/1646.5-1660.5 MHz band N87-15364
The United States mobile satellite service N87-15381
Implications of the strategic defense initiative for ABM treaty
[AD-A171145] N87-15909
UNIVERSITIES
The facilitation of direct searching of online services by the end user in academic libraries N87-15899
UNSTEADY FLOW
Unsteady aerodynamic load estimates on turning vanes in the national full-scale aerodynamic complex
[NASA-TM-88191] N87-15179
Unsteady aerodynamic and heat transfer processes in a transonic turbine stage N87-15220
UNSTEADY STATE
An efficient algorithm for solution of the unsteady transonic small-disturbance equation
[NASA-TM-89014] N87-15176
UPLINKING
Received optical power calculations for optical communications link performance analysis N87-15333
X-band uplink feedcone capabilities, components, and layout N87-15344
UPPER ATMOSPHERE
COCHISE atmospheric nitrogen/oxygen excitation studies
[AD-A172234] N87-15667
UPSTREAM
Development of upwind schemes for the Euler equations
[NASA-CR-4043] N87-15188
URANIUM ISOTOPES
Development of a single-mode dye laser pumped by a copper vapor laser N87-15769
URANUS (PLANET)
Sporadic narrowband radio emissions from Uranus
[AD-A170947] N87-15928
URBAN RESEARCH
Problems in the application of thermal images in urban climatology N87-15649
URBAN TRANSPORTATION
VECOM: A powerful local communication channel between vehicle-borne and roadside systems N87-15367
USER MANUALS (COMPUTER PROGRAMS)
User's guide to programming fault injection and data acquisition in the SIFT environment
[NASA-TM-87638] N87-15722
USER REQUIREMENTS
Computer networking — aerospace research N87-15250
Space station experiment definition: Advanced power system test bed
[NASA-CR-179502] N87-15270
The United States mobile satellite service N87-15381
Transformation of the logic of a thematic map construction model to a user interface in automated cartography N87-15501
The differing requirements of producers and users of data and the design of topographic/cartographic databases N87-15502
Map data requirement for civil land vehicle navigation and location synopsis N87-15511
Data needs and data bases for climate studies N87-15571
User definable syntax for specification languages. Annexe D4.A1 of deliverable D4 — programming languages N87-15717
Design of a graphics user interface for a database management system
[AD-A171393] N87-15730
The facilitation of direct searching of online services by the end user in academic libraries N87-15899

V

VACILLATION
Nonlinear wave vacillation in the atmosphere
[NASA-CR-179985] N87-15659
VACUUM APPARATUS
Thermal vacuum heater array apparatus
[AD-D012436] N87-15420
VALLEYS
Assessment of wind and fluvial action by using LANDSAT-MSS color composites in the lower Nile Valley (Egypt) N87-15612
Measurements and estimations of the energy balance and surface temperature of the Dischma Valley (Switzerland) N87-15650
VAN DER WAAL FORCES
Statistical mechanics of one-dimensional systems. 4: Generalization of the hard-core repulsion in multicomponent gases N87-15755
VANADIUM
Tensile behavior of helium-implanted and neutron-irradiated V-15Cr-5Ti
[DE86-007301] N87-15292
An interdisciplinary approach to predictive modeling of structural adhesive bonding. Characterization of Ti-6Al-4V oxides and the adhesive/oxide interphase
[AD-A172313] N87-15312
VANES
Unsteady aerodynamic load estimates on turning vanes in the national full-scale aerodynamic complex
[NASA-TM-88191] N87-15179
VAPOR DEPOSITION
An overview of CVD processes
[NASA-TM-88450] N87-15283
Chalcogenide glasses. Part 4: Crystallization and glass transition characteristics in AS(2-x)Sb(x)S(3) glass-forming system
[AD-A171564] N87-15310
Rugged, thin GaAs solar cell development, phase 1
[AD-A171188] N87-15520
Laser-induced chemical vapor deposition of germanium and doped-germanium films
[AD-D012462] N87-15888
VAPORS
Study of the kinetics of catalytic decomposition of hydrazine vapors on palladium
[NASA-TM-88549] N87-15286
VARIABLE STARS
A spectral analysis of RV Tauri variables N87-15912
VECTOR ANALYSIS
Large deviation local limit theorems for random vectors
[AD-A171176] N87-15746
VECTORS (MATHEMATICS)
Vector image method for the derivation of elastostatic solutions for point sources in a plane layered medium. Part 1: Derivation and simple examples
[NASA-CR-180062] N87-15743
Image method for the derivation of point sources in elastostatic problems with plane interfaces
[NASA-CR-180060] N87-15744
VEGA PROJECT
Pathfinder operations N87-15355
VEGA Pathfinder navigation for Giotto Halley encounter N87-15356
VEGETATION
Estimation of vegetation cover at subpixel resolution using LANDSAT data
[NASA-CR-177077] N87-15514
Data needs and data bases for climate studies N87-15571
Vegetation index and surface temperature in a mesoscale climate model — Alps N87-15592
Observations of the seasonal variability of soil moisture and vegetation cover over Africa using satellite microwave radiometry N87-15593
Vegetation identification and variability in the Tahoua area, Nigeria — LANDSAT thematic mapper N87-15610
Vegetation change and desertification in the Caribbean N87-15619
AVHRR and MSS data based vegetation indices studies over Indian sites — NOAA radiometer (AVHRR) LANDSAT multispectral scanner (MSS) N87-15622
The use of remote sensing techniques in the study of vegetation recovery after fire in mediterranean countries (a preliminary study) N87-15623
VEGETATIVE INDEX
The use of aerial remote sensing in a case study of desertification: Quixaba-PE
[INPE-3963-PRE/980] N87-15519
Satellite-derived vegetation index over Europe N87-15583
Vegetation index models for the assessment of vegetation in marginal areas N87-15584
Calibration of normalized vegetation index against pasture growth — NOAA-7 data N87-15585
VELOCITY
The perception of the higher derivatives of visual motion
[AD-A171076] N87-15687
VENUS ATMOSPHERE
Models of the Venus ionospheric flow N87-15820
VENUS PROBES
Selection of radio sources for Venus balloon-Pathfinder Delta-DOR navigation at 1.7 GHz N87-15357
VENUS SURFACE
Geological-morphological description of the Lakshmi planum (photomap of the Venusian surface sheet B-4)
[NASA-TM-88495] N87-15926
VERTICAL ORIENTATION
Measuring and modeling solar irradiance on vertical surfaces
[DE86-010737] N87-15668
VERTICAL TAKEOFF AIRCRAFT
An experimental investigation of a circular thrust augmenting ejector
[AD-A172376] N87-15231
VERY LARGE SCALE INTEGRATION
A single VLSI chip for computing syndromes in the (225, 223) Reed-Solomon decoder N87-15340
Systolic VLSI for Kalman filters N87-15360
VIBRATION DAMPING
Application of higher harmonic blade feathering on the OH-6A helicopter for vibration reduction
[NASA-CR-4031] N87-15175
Identification of damping parameters of a squeeze-film bearing
[AD-A169678] N87-15470
VIDEO SIGNALS
Large TV display system
[NASA-CASE-NPO-16932-1] N87-15413
VIEWING
The effect of viewing aspect on climatological cloud distribution
[AD-A170440] N87-15672
Minimum points and views for the recovery of 3-dimensional structure
[AD-A171148] N87-15696
VIRTUAL PROPERTIES
The virtual tree processor. Deliverable D2.A2 of task T2 N87-15715
VISCOPLASTICITY
An endochronic rate-sensitive constitutive equation for metals: Application to generalized creep
[AD-A172705] N87-15298
Shear localization in rate and temperature dependent solids N87-15477
VISCOUS FLOW
Viscous analyses for flow through subsonic and supersonic intakes
[NASA-TM-88831] N87-15173
Two- and three-dimensional viscous computations of a hypersonic inlet flow
[NASA-TM-88923] N87-15441
VISIBLE INFRARED SPIN SCAN RADIOMETER
Utilization of VAS satellite data in the initialization of an oceanic-cyclogenesis simulation
[NASA-CR-180140] N87-15671
VISION
Intracortical interactions in visual processing
[AD-A169674] N87-15684
A programming environment for parallel vision algorithms
[AD-A171561] N87-15739
VISUAL ACUITY
The effect of long term monocular occlusion on vernier threshold: Elasticity in the young adult visual system
[AD-A171289] N87-15688

VISUAL PERCEPTION
Effects of extended camera baseline and image magnification on target detection time and target recognition with a stereoscopic TV system [AD-A171063] N87-15398
The perception of the higher derivatives of visual motion [AD-A171076] N87-15687
Minimum points and views for the recovery of 3-dimensional structure [AD-A171148] N87-15696
The effects of response modality on interference between stimulus dimensions [AD-A171177] N87-15697

VOCODERS
Modulation and voice coding for mobile satellite applications N87-15378

VOICE COMMUNICATION
The use of interactive voice systems to improve multiple-task performance [AD-A171492] N87-15703

VOICE DATA PROCESSING
Modulation and voice coding for mobile satellite applications N87-15378

VORTEX FLAPS
Applicability of linearized-theory attached-flow methods to design and analysis of flap systems at low speeds for thin swept wings with sharp leading edges [NASA-TP-2653] N87-15174

VORTEX SHEDDING
Numerical simulations of the flowfield in a central-dump ramjet combustor. Part 1: Test of the model and effects of forcing [AD-A170936] N87-15229

VORTICES
Numerical simulations of the flowfield in a central-dump ramjet combustor. Part 1: Test of the model and effects of forcing [AD-A170936] N87-15229
Interactions of coupled acoustic and vortical instabilities in rocket combustion chambers N87-15266
Vortical dissipation in two-dimensional shear flows [NASA-TM-89408] N87-15445
Vortices in magnetized plasmas N87-15802
Drift vortices in plasma modelled on fast-rotating shallow field N87-15862
Negative energy vortices in inhomogeneous plasma N87-15863
Alfven vortices in a homogeneous plasma N87-15864
Vortex and spiral structures in sheared flows — shallow water plasma analogy N87-15866

VULNERABILITY
Noise susceptibility: A comparison of two Naval aviator populations [AD-A172222] N87-15693

W

WAFERS
Stress in a bonded wafer [AD-A171056] N87-15493

WAKES
Preliminary study of a wing-tip vortex using laser velocimetry [NASA-TM-88343] N87-15185
Wind tunnel data from a rotor wake/airframe interaction study [AD-A171333] N87-15190

WALKING MACHINES
Space spider crane [NASA-CASE-LAR-13411-1] N87-15259

WALL PRESSURE
Procedure for computing transonic flows for control of adaptive wind tunnels [NASA-TM-88530] N87-15235
Direct calculation of wall interferences and wall adaptation for two-dimensional flow in wind tunnels with closed walls [NASA-TM-88523] N87-15236
An experimental investigation of wall pressure fluctuations beneath non-equilibrium turbulent flows [AD-A171508] N87-15449

WARNING SYSTEMS
Application of Barlow-Wu systems to safety monitoring systems N87-15757

WATER
Apparatus for determining the liquid water content of a gas [AD-D012453] N87-15288
Future directions for H sub x O sub y detection [NASA-CP-2448] N87-15528
Tropospheric HO2 determination by FAGE N87-15542

WATER EROSION
Assessment of wind and fluvial action by using LANDSAT-MSS color composites in the lower Nile Valley (Egypt) N87-15612

WATER FLOW
Vortex and spiral structures in sheared flows — shallow water plasma analogy N87-15866

WATER VAPOR
A new algorithm for microwave delay estimation from water vapor radiometer data N87-15345
Water vapor profiles for Washington, D.C.; Boulder, Colorado; Palestine, Texas; Laramie, Wyoming and Fairbanks, Alaska during the period 1974 to 1985: Data report [PB86-234822] N87-15675

WAVE DIFFRACTION
Effects of strong diffraction on the focusing and scattering of acoustic waves [AD-A171220] N87-15776

WAVE EQUATIONS
Negative energy vortices in inhomogeneous plasma N87-15863

WAVE FRONTS
Irregular wavefronts in data-driven data-dependent computations [AD-A171151] N87-15727

WAVE GENERATION
The generation of radio waves in the inhomogeneous magnetic field of the pulsar magnetosphere N87-15849

WAVE INTERACTION
Nonlinear conversion emission mechanisms in the open plasma systems in astrophysics N87-15840

WAVE PROPAGATION
Initial-boundary value problems for linear hyperbolic systems [AD-A171527] N87-15747
Propagation of nonlinear modulated Alfven waves in spicules and magnetic flux tubes N87-15809

WAVE REFLECTION
Influence of reflected ions on the front structure of quasi-perpendicular collisionless shock waves N87-15829

WAVEGUIDE ANTENNAS
Interleaved arrays antenna technology development [NASA-CR-171951] N87-15393

WAVEGUIDES
Research in nonlinear acoustics [AD-A172634] N87-15777

WEAPON SYSTEMS
Research program on a compact and high-power microwave tube [AD-A171567] N87-15430

WEATHER FORECASTING
Rainfall estimation over the Sahel using Meteosat thermal infra-red data N87-15587
Toward a drought-oriented climatic prediction system in Western Sudan N87-15806
Utilization of satellite data in mesoscale modeling of severe weather [NASA-CR-179917] N87-15669
Utilization of VAS satellite data in the initialization of an oceanic-cyclogenesis simulation [NASA-CR-180140] N87-15671

WEIGHTLESSNESS
Biochemical changes in bone in a model of weightlessness [NASA-CR-180095] N87-15683

WEIGHTLESSNESS SIMULATION
Weightlessness simulation system and process [NASA-CASE-ARC-11646-1] N87-15253
Bedrest in healthy women: Effects of menstrual function and oral contraceptives [NASA-CR-171946] N87-15681

WELD STRENGTH
Residual life. Information Day of the Dutch Institute of Welding Techniques [ETN-87-98730] N87-15479
Assessment of creep loaded high temperature installations N87-15481

WELDING
FEM model of 3D transient temperature and stress fields in welded plates N87-15476
Technology Reports of the Osaka University, volume 36, nos. 1844-1864 [ISSN-0030-6177] N87-15754
Improvement of image quality of radiograph by means of narrow area radiation method N87-15760

WEST GERMANY
Colloquium about Joint Projects within the DFVLR/ISRO Cooperation [DFVLR-MITT-86-16] N87-15240
Status of ISRO/DFVLR cooperation N87-15241
Possible areas of collaboration between DFVLR and ISRO in the fields of structures and materials N87-15252

WHISKER COMPOSITES
Metallurgical variables influencing the corrosion susceptibility of P/M (Powder Metallurgy) 7091 Aluminum/SiCw composite [AD-A170948] N87-15294

WHITE DWARF STARS
Automatic parameterization and analysis of stellar atmospheres: A study of the DA white dwarfs N87-15918
The transformation from planetary nebula nucleus to white dwarf: A seismological study of stellar metamorphosis N87-15919

WIND EFFECTS
Measurements and estimations of the energy balance and surface temperature of the Dischma Valley (Switzerland) N87-15650

WIND EROSION
Assessment of wind and fluvial action by using LANDSAT-MSS color composites in the lower Nile Valley (Egypt) N87-15612

WIND PROFILES
Nowcasting thermodynamic profiles using a triangle of wind profilers in an advection model [AD-A171288] N87-15673

WIND TUNNEL APPARATUS
Development of an artificial boundary layer for different outlet flows N87-15167
Investigation of the conditions for tripping transition with roughness elements and their influence on boundary layer development N87-15168
Transition detection using surface pressure holes N87-15170
Investigation of the experimental detection of boundary layer transition N87-15171

WIND TUNNEL MODELS
The dynamic scaling and development of model helicopter rotor blades for the RAE 24ft wind tunnel test rig [RAE-TR-85052] N87-15203

WIND TUNNEL NOZZLES
Thermal analysis and design of a cooling system for a Mach 14 nozzle [NASA-CR-180096] N87-15271

WIND TUNNEL TESTS
Boundary layer control by transition fixing [ESA-TT-909] N87-15160
Problems of the application of wind tunnel results to aerodynamic performance of large aircraft N87-15161
Transition fixing on wings in industrial wind tunnels and associated problems N87-15165
Transition detection using surface pressure holes N87-15170
Investigation of the experimental detection of boundary layer transition N87-15171
A comparison of the acoustic and aerodynamic measurements of a model rotor tested in two anechoic wind tunnels [NASA-TM-88364] N87-15178
Unsteady aerodynamic load estimates on turning vanes in the national full-scale aerodynamic complex [NASA-TM-88191] N87-15179
Wind tunnel data from a rotor wake/airframe interaction study [AD-A171333] N87-15190
Direct calculation of wall interferences and wall adaptation for two-dimensional flow in wind tunnels with closed walls [NASA-TM-88523] N87-15236
An experimental investigation of wall pressure fluctuations beneath non-equilibrium turbulent flows [AD-A171508] N87-15449

WIND TUNNELS
Appropriate technology small grants program [DE86-015463] N87-15523

WIND TURBINES
Appropriate technology small grants program [DE86-015463] N87-15523

WIND VELOCITY
Nowcasting thermodynamic profiles using a triangle of wind profilers in an advection model [AD-A171288] N87-15673

WINDOWS
A comparison of two window systems — computer user interfaces N87-15710
Definition of common interfaces. Deliverable D2 of task T2 — computer programming environments N87-15712
Interfaces between LISP and A Screen Handler (ASH). Deliverable D2.A2 of task T2 N87-15714

WINDPOWER UTILIZATION
Appropriate technology small grants program [DE86-015463] N87-15523

WING FLOW METHOD TESTS
Transition fixing on wings in industrial wind tunnels and associated problems N87-15165

WING PROFILES
Transition fixing in the high speed range for the development of civil aircraft wings N87-15164
The influence of transition strips on the pressure distribution on transonic profiles N87-15166
Investigation of the conditions for tripping transition with roughness elements and their influence on boundary layer development N87-15168
TRANDESNF: A computer program for transonic airfoil design and analysis in nonuniform flow
[NASA-CR-4044] N87-15186
WING TIP VORTICES
Preliminary study of a wing-tip vortex using laser velocimetry
[NASA-TM-88343] N87-15185
WINGS
Aerodynamic characteristics of two-dimensional wing configurations at angles of attack near -90 deg
[NASA-TM-88373] N87-15182
Subsonic maneuver capability of a supersonic cruise fighter wing concept
[NASA-TP-2642] N87-15184
WIRE
Investigation of the conditions for tripping transition with roughness elements and their influence on boundary layer development N87-15168
WORDS (LANGUAGE)
The effects of response modality on interference between stimulus dimensions
[AD-A171177] N87-15697
WORKLOADS (PSYCHOPHYSIOLOGY)
Use of disjunctive response requirements in dual-task environments: Implications for automation
[AD-A171277] N87-15702
WORLD DATA CENTERS
Global runoff data sets and use of geographic information systems N87-15570

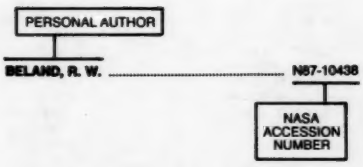
X

X RAY ASTRONOMY
X-ray satellite (ROSAT)
[NASA-TM-88499] N87-15261
Theoretical analysis of segmented Wolter/LSM X-ray telescope systems
[NASA-CR-178986] N87-15915
X RAY SCATTERING
Mechanical properties versus morphology of ordered polymers, volume 6
[AD-A171221] N87-15307
X RAY SOURCES
Accreting pulsars: Some recent theoretical results N87-15857
Model of bimodal behavior of Cygnus X-1 N87-15875
EX56a study of extended X-ray emission around isolated galaxies EX56b identification and spectra of bright X-ray sources at high galactic latitude
[NASA-CR-180099] N87-15931
X RAY SPECTRA
X-ray spectroscopy with Z-pinch neon plasmas
[AD-A172228] N87-15879
X RAY TELESCOPES
Theoretical analysis of segmented Wolter/LSM X-ray telescope systems
[NASA-CR-178986] N87-15915
Experimental evaluation of the ring focus test for X-ray telescopes using AXAF's technology mirror assembly, MSFC CDDF Project No. H20
[NASA-TM-86570] N87-15916
X RAY TUBES
SLAC pulsed X-ray facility
[DE86-012045] N87-15456

Z

ZETA PINCH
X-ray spectroscopy with Z-pinch neon plasmas
[AD-A172228] N87-15879
ZINC COMPOUNDS
Transmission electron microscope and photoluminescence studies of ZnS crystalline films grown by low-pressure MOCVD N87-15766
Preparation and characterization of several 2-4-V2 stannite single crystals
[AD-A172238] N87-15890

Typical Personal Author Index Listing



Listings in this index are arranged alphabetically by personal author. The NASA accession number denotes the number by which the citation is identified.

A

ABBOTT, JOHN K. N87-15680
ABDELLAOUI, A. N87-15590
ABURDZHANIYA, G. N87-15864
N87-15865
ADACHI, SATORU N87-15769
ADCOCK, JERRY K. N87-15730
ADEFOLALU, D. O. N87-15805
AGARWAL, VINOD S. N87-15294
AGUIRRE, S. N87-15342
AHLSTROM, H. G. N87-15347
AIDALA, P. N87-15189
AKIMA, H. N87-15410
ALAVI, A. N87-15297
ALI, A. W. N87-15878
ALLEN, D. H. N87-15264
ALLEN, JOHN E. N87-15420
ALTEROVITZ, SAMUEL A. N87-15305
AMARDEIL, P. N87-15775
AMECKE, JUERGEN N87-15236
AMINPOUR, MOHAMMAD ALI N87-15276
AN, SEHUA N87-15254
ANDERSEN, GEORGE J. N87-15696
ANDERSON, B. G. N87-15706
ANDERSON, T. W. N87-15753
ANDRES, E. M. N87-15350
ANSEL, CLIFFORD A. N87-15682
ANTAR, BASIL N. N87-15659
ANTON-GUIRGIS, H. N87-15686
ANTONOVA, R. A. N87-15862
APELBAUM, L. O. N87-15286
ARAI, YASUSHI N87-15769
AREFIEV, V. S. N87-15829
ARNAL, D. N87-15168
ARNOLDUS, HENK F. N87-15886
ASBECK, P. M. N87-15426
ASEM, A. N87-15625
ASFAR, L. N87-15625
AUBIER, M. G. N87-15813
AUERKARI, PERTTI N87-15758
AUSTIN, L. N87-15598
AYALA, S. N87-15395

B

BABBITT, RICHARD W. N87-15422
BAEKLER, P. N87-15897
BAES, CHARLES F., III N87-15473
BAHAR, EZEKIEL N87-15401
BAHR, A. J. N87-15474
BAKAN, S. N87-15633
BAKER, E. D. N87-15456
BAKER, T. S. N87-15478
BALIKHIN, M. A. N87-15829
BALLUFFI, R. W. N87-15301
N87-15302
BANKS, DANIEL W. N87-15180
BAR-YOSEPH, P. N87-15492
BARBERO, J. N87-15373
BARD, ALLEN J. N87-15423
N87-15425
N87-15427
BARON, R. GROLLIER N87-15324
BARRETT, E. C. N87-15586
BATHKER, D. N87-15331
BATINA, JOHN T. N87-15176
BATTRICK, BRUCE N87-15544
BAUCH, BERND N87-15654
BAUMGAERTEL, K. N87-15819
BAZDENKOV, S. V. N87-15866
BAZILEVSKIY, A. T. N87-15921
BEAR, J. N87-15692
BEATY, JAMES ROSS N87-15258
BECK, J. N87-15246
BECK, SHERWIN M. N87-15524
BECKER, F. N87-15625
N87-15626
BECKETT, WILLIAM B. N87-15681
BEDROSIAN, EDWARD N87-15394
BEINERT, J. N87-15496
BEIRAODA VEIGA, H. N87-15451
BENDURA, RICHARD J. N87-15524
BENI, P. N87-15595
BENNETT, BRUCE M. N87-15696
BENSON, THOMAS J. N87-15441
BEREZHKO, E. G. N87-15832
BERGSTRA, J. A. N87-15719
BERKOVITS, A. N87-15291
BERNATOWICZ, DANIEL T. N87-15267
BERTHE, CHARLES J., JR. N87-15234
BESKIN, V. S. N87-15844
N87-15850
BHAGAT, PRAMODE K. N87-15475
BHALLA, A. S. N87-15309
BHANJI, A. M. N87-15338
BHAVSAR, P. D. N87-15242
BILGUTAY, NIHAT M. N87-15737
BILLING, H. N87-15574
BINFORD, THOMAS O. N87-15471
BINGHAM, R. N87-15658
BIRD, R. E. N87-15668
BISBEE, CHARLES R., III N87-15402
BISNOVATYI-KOGAN, G. S. N87-15796
BLACKSTOCK, DAVID T. N87-15777
BLAD, BLAINE L. N87-15516
BLANC, J. L. N87-15379
BLANKINSHIP, MICHAEL S. N87-15690
BLAUSTEIN, BARBARA N87-15901
BLOEM, KATHRYN A. N87-15697
BLONDIN, C. A. N87-15552
BLOOM, A. L. N87-15661
BLUEMEL, KLAUS N87-15583
BOCHARTZ, WILHELM N87-15306
BODE, H. N87-15416
BOEHM, ALBERT R. N87-15672
BOGDANOV, S. YU. N87-15821
BOLLE, H.-J. N87-15610
BONAZZA, WALTER J. N87-15414
BONEBRIGHT, MARK E. N87-15390
BONN, FERDINAND N87-15617
BONNEL, B. N87-15577
N87-15638
BORIS, J. N87-15229
BOWDEN, JOHN H. N87-15318
BOWLINE, M. N87-15656
BOXWELL, D. A. N87-15178
BRACH, E. J. N87-15598
BRADSHAW, J. D. N87-15533
BRAGG, W. H. N87-15289
BRAND, A. G. N87-15190
BRASSEL, KURT N87-15499
BRAUN, M. J. N87-15442
BRAUNSTEIN, MYRON L. N87-15696
BRAUNSTEIN, RUBIN N87-15893
BRECKENRIDGE, F. R. N87-15778
BREHM, MATTHIAS N87-15650
BRIDGMAN, MICHAEL S. N87-15204
BRIGGS, DAVID N87-15510
BRON, W. E. N87-15892
BROWN, A. N87-15219
BROWN, CHRISTOPHER N87-15739
BROWN, ELTON R. N87-15238
BROWNELL, D. H., JR. N87-15495
BRUCHEZ, RAYMOND J. N87-15273
BRUTSAERT, WILFRIED N87-15550
BRYAN, CHARLES F., JR. N87-15259
BRYANT, D. A. N87-15658
BUCH, A. N87-15291
BUCKLEY, DONALD H. N87-15305
BUECHNER, J. N87-15823
BUEHLER, ROLF D. N87-15227
BULANOV, S. V. N87-15822
BULUSU, S. N87-15319
BUMKE, K. N87-15635
BUNI, K. N87-15383
BURGSMUELLER, W. N87-15164
BURIEZ, J. C. N87-15377
N87-15638
BURK, B. D. N87-15333
BURKHALTER, P. G. N87-15879
BUSKIRK, FRED R. N87-15457
BYRNS, E. V., JR. N87-15175

C

CALEDONIA, G. E. N87-15687
CAMPARO, JAMES C. N87-15773
CAMPBELL, DONN V. N87-15399
CAMPONESCHI, E. T., JR. N87-15281
CANNON, MARK R. N87-15193
CANNON, ROBERT H. N87-15471
CAPLOT, M. N87-15178
CAPPELINI, V. N87-15621
CAPPELLINI, V. N87-15595
CARDER, JAMES H. N87-15419
CARLA, R. N87-15595
N87-15621
CARLSON, HARRY W. N87-15174
CARNEBIANCA, C. N87-15383
CARO, EDWARD N87-15414
CARPENTER, S. H. N87-15299
CARRIE, B. N87-15775
CARSON, D. J. N87-15556
CASEWELL, I. E. N87-15376
CHABIBRACHMANOV, I. CH. N87-15814
CHAGANTY, NARASINGA R. N87-15746
CHAGELISHVILI, G. D. N87-15869
N87-15875
CHAHINE, GEORGE L. N87-15448
CHAHINE, M. T. N87-15573
CHAKRAVARTHY, SUKUMAR R. N87-15188
CHAN, C. Y. N87-15532
N87-15542
CHANG-DIAZ, FRANKLIN R. N87-15465
CHANG, J. F. N87-15186
CHANG, J. J. N87-15360
CHANG, KOU-I N87-15520
CHANISHVILI, R. G. N87-15875
CHAO, S. H. N87-15915
CHARBONNEAU, LISE N87-15617
CHARGEISHVILI, B. B. N87-15809
N87-15851
CHARI, S. T. N87-15622
CHASTAIN, GEORGENE C. N87-15902
CHAVEZ, P. F. N87-15436
CHEDIA, O. V. N87-15854
CHEN, ALICE J. N87-15450
CHEN, JINGZHONG N87-15254
CHEN, TIMOTHY S. N87-15275
N87-15304
CHENG, LI-JEN N87-15883
CHERITON, DAVID R. N87-15725
CHHONKAR, R. P. S. N87-15622
CHIARANTINI, L. N87-15589
CHIE, C. M. N87-15391
CHIEN, YI-TZUU N87-15724
CHITNIS, E. V. N87-15251
CHOE, J. Y. N87-15430
CHOU, G. D. N87-15316
CHRISTOU, JULIAN CHARLES N87-15914
CHUBB, DONALD L. N87-15452
CHUDNOVSKY, D. V. N87-15748
CHUDNOVSKY, G. V. N87-15748
CICERONE, RALPH N87-15539
CIDECIYAN, R. N87-15391

CIESLIK, S. N87-15599
CLEMENT, D. N87-15711
N87-15712
N87-15713
N87-15718
CLIFFORD, S. F. N87-15404
COIFFIER, J. N87-15553
COLEMAN, PAUL HENRY N87-15930
COLLINS, EARL R., JR. N87-15327
CONESE, C. N87-15621
CONRAD, RAYMOND W. N87-15199
COOK, C. M. N87-15437
COOPER, DAVID E. N87-15535
COOPER, H. W. N87-15348
COOTE, M. A. N87-15197
COULMANN, S. N87-15633
COX, D. G. N87-15347
COY, J. J. N87-15466
CRANE, CHARLES R. N87-15680
CRANE, R. M. N87-15281
CRANE, ROBERT L. N87-15310
CRAWFORD, MICHAEL E. N87-15213
N87-15214
N87-15215
N87-15216
CRAYSTON, JOSEPH A. N87-15423
N87-15425
N87-15427
CRONIN-GOLOMB, MARK N87-15461
CROSLEY, DAVID R. N87-15528
CULVER, B. D. N87-15686
CUGLOCK, V. G. N87-15697

D

DACOSTA, A. A. N87-15855
DACRES, CHESTER M. N87-15419
DAELS, L. N87-15612
DAMOS, DIANE L. N87-15703
DARDEN, CHRISTINE M. N87-15174
DATTA, SUBHENDU K. N87-15494
DAUD, TAHER N87-15882
DAVIDSON, JOHN N87-15500
DAVIS, B. R. N87-15523
DAVIS, D. D. N87-15533
DAVIS, JOHN N87-15681
DECARVALHO, VITOR CELSO N87-15519
DEE-LUCAS, DIANA N87-15698
DEFAVERI, D. N87-15525
DEFRAIPONT, P. N87-15625
DEGROOT, J. F. G. N87-15792
DELATORRE, JUAN CARLOS N87-15613
DELORME, C. N87-15643
N87-15645
DEMELT, K. N87-15416
DENNIS, RICHARD J. N87-15688
DESAI, P. S. N87-15620
DESCHAMPS, P. Y. N87-15625
DESCHAMPS, PIERRE-YVES N87-15578
DESJARDINS, R. L. N87-15596
DESPEYROUX, J. N87-15718
DESPEYROUX, T. N87-15712
N87-15713
N87-15718
DESSOUKY, K. N87-15391
DEUTSCH, L. J. N87-15340
DEVERDIERE, R. N87-15362
DEVIN, M. N87-15712
N87-15714
DIAMANTOPOULOS, J. N87-15623
DICKINSON, R. E. N87-15562
DICKINSON, ROBERT E. N87-15561
DICKMAN, STEVEN R. N87-15676
N87-15677
DIDEBULIDZE, G. G. N87-15816
DIETRICH, B. N87-15644
DINI, P. W. N87-15585
DOERRER, R. N87-15639
DOGIEL, V. A. N87-15834
DOLGINOV, A. Z. N87-15672
DOOGE, JAMES C. I. N87-15547
DORIAN, JOHN N87-15265
DORIGO, GUIDO N87-15499
DORTLAND, W. N87-15482
N87-15485
DOUGLAS, SHARON G. N87-15671
DOYLE, JAMES D. N87-15670
DREW, HELEN N87-15681
DSOUZA, G. N87-15586
DUBOWICZ, PALEMON W. N87-15399
DUDLEY, R. L. N87-15319
DUFOUR, L. B. N87-15487
DUGDALE, G. N87-15587
N87-15609
DUNN, MICHAEL G. N87-15209
N87-15210
N87-15211
N87-15212
DUPUIS, P. N87-15385
DURHAM, RICHARD N87-15664
DUVEL, J. P. N87-15634
DWIGHT, KIRBY N87-15890
DWOYER, DOUGLAS L. N87-15183

E

EAGLESON, PETER S. N87-15514
EBY, EDWARD S. N87-15405
EDELMAN, R. B. N87-15289
EFRON, L. N87-15358
EHHALT, D. H. N87-15530
EHMANN, A. N87-15284
EISLER, GERALD RICHARD N87-15202
EITZEN, D. G. N87-15778
EL-GENK, M. S. N87-15785
ELDREDGE, DONALD N87-15204
ELKS, CARL R. N87-15722
ELLIS, J. N87-15356
ELSENAAR, A. N87-15163
ELTOM, MAHDI AMIN N87-15606
EMERY, FRANKLIN TIMOTHY N87-15412
ENDECOTT, BOYD R. N87-15680
ENGEL, J. H. N87-15347
ERICKSON, D. S. N87-15522
EROKHIN, N. S. N87-15858
ESSER, G. N87-15572
ETIENNE, C. F. N87-15484
N87-15485
N87-15489
EULDERINK, F. N87-15843
EVANS, D. S. N87-15656
EYRE, L. ALAN N87-15619

F

FADEEV, A. P. N87-15858
FANELLI, N. A. N87-15358
FARABEE, THEODORE M. N87-15449
FARES, NABIL N87-15743
N87-15744
FARRIS, R. J. N87-15307
FEDERICO, GENNARO N87-15265
FEINSOD, M. N87-15692
FELDMAN, V. I. N87-15921
FERN, D. G. N87-15417
FERRAIOLO, G. N87-15525
FERRANDO, B. N87-15525
FILBEY, J. A. N87-15312
FINLEY, S. N87-15355
FIOCCO, G. N87-15596
FISCHER, G. N87-15250
FISHER, JOSEPH A. N87-15682
FISHER, VERNIE G., III N87-15699
FISHKOVA, L. M. N87-15816
FISKE, M. R. N87-15320
FLANAGAN, D. P. N87-15735
FLANNER, PHILIP N87-15207
FLEMING, H. N87-15896
FLIFLET, ARNE W. N87-15459
FLINN, J. E. N87-15300
FLITCROFT, I. D. N87-15609
FLOCK, W. L. N87-15359
FLORES, ARNOLD N87-15428
FLOYD, ROBERT E. N87-15774
FOERSTER, K. N87-15224
FOGEL, DAVID N87-15741
FOGEL, LAWRENCE J. N87-15741
FONTECHA, J. L. N87-15373
FORBES, JEFFREY M. N87-15666
FORCH, BRAD E. N87-15483
FORSTEN, J. N87-15293
FORTH, C. J. P. N87-15222
FORTNEY, SUZANNE M. N87-15681
FOUQUART, Y. N87-15577
N87-15638
FOX, CHARLES H., JR. N87-15184
FRACASSINI, M. N87-15856
FRANK, A. G. N87-15821
FRANKLIN, JANET N87-15518
FRANZ, H. P. N87-15162
FREILEY, A. N87-15344
FRUEHOLZ, ROBERT P. N87-15773
FUJII, KATSUHIKO N87-15761
FUJIWARA, ETSUO N87-15768
FUNK, M. N87-15560

G

GABRIELSON, T. B. N87-15776
GAD, A. N87-15612
GALEEV, A. A. N87-15814
N87-15835
N87-15836
GALINDO-ISRAEL, V. N87-15331
GALLER, DONALD E. N87-15269
GALLOT, L. N87-15712
N87-15714
GARDNER, J. N87-15229
GAULENE, P. N87-15704
GAVRYUSEVA, E. A. N87-15807
GEDALIN, M. E. N87-15829
N87-15840
GEERLINGS, J. H. T. N87-15411
GELB, A. N87-15667
GELEYN, J. F. N87-15553
GENTILE, FRANK T. N87-15311
GEORGE, THOMAS F. N87-15886
GEORGEKUTTY, T. N87-15320
GEPHART, JOHN WESLEY N87-15527
GERASIMOV, B. P. N87-15444
GERBER, HERMANN N87-15674
GERBER, HERMANN E. N87-15268
GILLINGHAM, KENT K. N87-15685
GIOT, MICHEL N87-15325
N87-15326
GLASCO, INGRID T. M. N87-15900
GLATT, BENJAMIN N87-15206
GLICKSMAN, L. R. N87-15314
GLOVER, R. C. N87-15268
GLUCK, HENRY N87-15689
GNEDIN, YU. N. N87-15800
GOBBI, G. P. N87-15596
GOGUEN, JOSEPH A. N87-15726
GONZALEZ, A. N87-15373
GOODYEAR, CHARLES D. N87-15699
GOPALSWAMY, N. N87-15813
GORDON, C. T. N87-15549
GORDON, STEPHEN S. N87-15786
GOUTORBE, J. P. N87-15627
GOWARIKER, V. N87-15252
GRANTHAM, DONALD D. N87-15672
GRASSL, H. N87-15635
GRASSL, HARTMUT N87-15636
N87-15648
N87-15651
N87-15652
GRATZKI, A. N87-15578
N87-15637
GREEN, DAVID F. N87-15722
GREENBERG, RONALD I. N87-15738
GREENSPAN, M. N87-15778
GREGORY, GERALD L. N87-15524
GRIMM, BERNHARD N87-15315
GROCE, J. L. N87-15197
GROSSBECK, M. L. N87-15292
GROVE, RAY N87-15279
GRUGELKE, GUNNAR N87-15501
GRUN, J. N87-15880
GRZEDZIELSKI, S. N87-15818
GU, HAI BON N87-15764
GUPTA, R. K. N87-15622
GUREVICH, A. V. N87-15834
N87-15844
N87-15850
GURNETT, D. A. N87-15928
GUYENNE, T. D. N87-15361
N87-15793
GUZKOWSKA, M. A. J. N87-15588
GVARAMADZE, V. V. N87-15873

H

HABERLAND, C. N87-15171
HAEFNER, H. N87-15618
HAENEL, GOTTFRIED N87-15646
HAFTKA, RAPHAEL T. N87-15205
HAGIHARA, HIROYUKI N87-15757
HAHN, S. K. N87-15894
HAIRSTON, MARC ROTAN N87-15924
HAISLER, W. E. N87-15264
HALL, CHARLES EDWARD, JR. N87-15233
HALL, D. S. N87-15658
HALLIYAL, A. N87-15309
HAN, KWANG S. N87-15460
HANDSCHUH, R. F. N87-15466
HANSEN, P. M. N87-15417
HARD, T. M. N87-15532
N87-15542
HARIHARAN, T. A. N87-15620
HARRIS, R. N87-15584
HARTOP, R. N87-15344
HASCOET, L. N87-15718
HASENJEAGER, H. N87-15599
HASKINS, R. N87-15573
HATCH, C. N87-15203

HATFIELD, WILLIAM E. N87-15891
HAYAKAWA, S. N87-15828
HAYASHI, SHIGENORI N87-15764
HAYWOOD, PETER N87-15502
HEBNER, R. E. N87-15435
HEERING, JAN N87-15707
N87-15708
N87-15716
N87-15717
N87-15719
N87-15720
N87-15721
HEIMBUCH, ALVIN H. N87-15304
HEIMER, NORMAN E. N87-15313
HEINEMANN, MICHAEL N87-15257
HELLDEN, ULF N87-15604
HENDERSON-SELLERS, A. N87-15562
HENDRICKS, R. C. N87-15442
HENDRIKS, P. H. R. N87-15719
HENNEMUTH, BARBARA N87-15650
HENNINGS, DETLEF N87-15654
HERNANDEZ, D. N87-15386
HERNANZ, M. L. N87-15373
HERZOG, ADRIAN N87-15499
HEWITT, R. G. N87-15839
HIGDON, ROBERT L. N87-15747
HILBIG, R. N87-15161
HILEMAN, L. R. N87-15348
HILL, R. J. N87-15404
HINZPETER, H. N87-15633
HIRAKI, AKIO N87-15766
HIRANO, HITOSHI N87-15770
HIRAYAMA, KAZUO N87-15760
HIROSE, YOSHIO N87-15767
HITT, ELLIS F. N87-15204
HO, D. N87-15625
HO, JOHN N87-15433
HOELL, JAMES M. N87-15528
HOFFMAN, DONALD D. N87-15696
HOFFMAN, J. N87-15553
HON, DAVID N87-15790
HONEGGER, DOUGLAS G. N87-15453
HOOKE, LYDIA RAZRAN N87-15679
HOOVER, M. D. N87-15785
HOPF, F. A. N87-15458
HOPPE, D. J. N87-15338
HORAK, J. A. N87-15292
HORNE, W. CLIFTON N87-15445
HOUARI, YACINE N87-15433
HOVERTER, ROBERT T. N87-15399
HOWARD, JAMES H., JR. N87-15691
HOWE, T. N87-15353
HSU, I. S. N87-15340
HSU, MING-TA S. N87-15275
N87-15304
HSU, S. L. N87-15307
HUBBARD, KENNETH G. N87-15516
HUCK, R. W. N87-15378
HUETTER, RUDOLF L. N87-15503
HUMINSKI, PATRICIA A. N87-15690
HUNT, J. N87-15361
HUNTON, DONALD E. N87-15265
HURD, W. J. N87-15342
HURON, ERIC S. N87-15303

I

ICKE, V. N87-15843
IKAWA, NAOYA N87-15770
IKEDA, KAZUYOSI N87-15755
IKEDA, OSAMU N87-15772
ILES, PETER A. N87-15520
IMBRIALE, W. N87-15331
INCE, F. N87-15624
INMAN, RICHARD TOBIAS N87-15920
INOUE, YOSHIO N87-15771
IPE, N. E. N87-15456
ISACKS, B. L. N87-15661
ISAKOV, S. B. N87-15840
ISHAI, O. N87-15492
ISTOMIN, YA N. N87-15834
ISTOMIN, YA. N. N87-15844
N87-15850
IVANOV, B. A. N87-15662
N87-15921
IWAKURA, CHIAKI N87-15772
IYER, R. SUBRAMONIA N87-15538
IZUMI, K. H. N87-15197

J

JANSSEN, P. H. M. N87-15751
JASINSKI, MICHAEL F. N87-15514
JI, JIN-JUN N87-15567
JOHANSEN, T. H. N87-15884
JOHNSON, GARY S. N87-15277
JOHNSON, N. M. N87-15884
JOHNSON, VICTOR J. N87-15469
JONES, ARTHUR M. N87-15723
JONES, T. V. N87-15222
JONES, TODD R. N87-15749
JOSHI, P. C. N87-15620
JUNKINS, JOHN L. N87-15263

K

KAHN, G. N87-15708
N87-15709
N87-15716
N87-15718
KAHN, WALTER K. N87-15396
KAHNIASHVILI, T. A. N87-15799
KAILASANATH, K. N87-15229
KALADZE, T. D. N87-15663
KALTHOFF, J. F. N87-15496
KALUMUCK, KENNETH M. N87-15446
KAMINKER, A. D. N87-15847
KANABE, TADASHI N87-15767
KANDEL, R. N87-15634
KANE, JAMES H. N87-15705
KANETO, KEIICHI N87-15765
KANIC, P. G. N87-15272
KAPLAN, PHILIP D. N87-15406
KARAGICHEV, A. B. N87-15444
KARAMCHETI, KRISHNAMURTY N87-15445
KARNI, Z. N87-15692
KASSER, P. N87-15560
KASTE, KEITH N87-15271
KASTNER, BERNICE N87-15742
KAUFMAN, LLOYD N87-15687
KAWAKAMI, YOICHI N87-15766
KAWALER, STEVEN DANIEL N87-15919
KAYABA, S. N87-15237
KAZBEGI, A. Z. N87-15849
KELLEY, B. A. N87-15268
KEMMLER-SACK, S. N87-15284
KERESELIDZE, Z. A. N87-15817
KERESTECIOGLU, ALI ALP N87-15440
KERMEL, F. N87-15643
N87-15645
KERN, HANS F. N87-15504
KERR, E. L. N87-15335
KERR, Y. N87-15591
KERSHAW, ROBERT N87-15890
KESSLER, JAMES H., IV N87-15911
KEYDEL, W. N87-15243
KHANTADZE, A. G. N87-15817
KHOMENKO, A. A. N87-15286
KIDSON, J. W. N87-15585
KIESLING, J. D. N87-15364
N87-15381
KILLION, DERLING N87-15390
KIMBELL, ALLYN N87-15681
KIMURA, H. N87-15695
KIMURA, ITSURO N87-15317
KINKEAD, REBECCA L. N87-15259
KINNE, STEFAN N87-15636
KIRK, A. N87-15330
KITTLESEN, GREGG P. N87-15423
N87-15425
N87-15427
KLEEORIN, N. I. N87-15874
KLINK, K. N87-15559
KLINT, P. N87-15706
N87-15716
N87-15717
N87-15719
N87-15720
KLOMAN, ERASMUS H. N87-15898
KMIEC, T. D. N87-15272
KMIEC, THOMAS D. N87-15269
KNIGHT, ROY WARD N87-15439
KNOTTENBERG, H. N87-15640
KOBAYASHI, TSURUO N87-15317
KOCHAROV, G. E. N87-15831
KOCHAROV, L. G. N87-15808
KOEHLER, ULF N87-15650
KOEPKE, P. N87-15644
KOEPKE, PETER N87-15581
KOERNER, M. A. N87-15337
KOK, GREGORY L. N87-15541
KOMERATH, N. M. N87-15190
KORNALIJNSLIJPER, M. N87-15481
KORNILOV, S. A. N87-15418
KORSCH, D. N87-15916
KOVALTSOV, G. A. N87-15808
KRAMER, PETER A. N87-15227
KRANAKIS, EVANGELOS N87-15740
KRASNOSELSKIKH, V. V. N87-15829
KREPLIN, H.-P. N87-15167
KRIEBEL, K. T. N87-15582
N87-15644
KRIEDTE, W. N87-15375
KRISHNAMURTHY, L. N87-15447
KRISTIANSEN, E. N87-15371
KRIVITSKY, V. S. N87-15840
KUENKLER, H. N87-15226
KUIPERS, H. N87-15611
KULSRUD, R. N87-15870
KUMAR, R. N87-15342
KUNIK, WILLIAM G. N87-15441
KURTH, W. S. N87-15928
KUZNETSOV, E. A. N87-15861
KUZNETSOVA, M. M. N87-15815
KVAM, E. P. N87-15301
KWOK, YUE-KUEN N87-15172
KYRIEI, N. P. N87-15821

L

LAEDKE, E. W. N87-15802
LAFRANCE, NORMAN N87-15681
LAGOUARDE, J. P. N87-15591
LAKE, L. N87-15383
LAKHIN, V. N87-15864
N87-15865
LAKHINA, G. S. N87-15825
LAN, C. EDWARD N87-15106
LANE, GREGG A. N87-15454
LANG, B. N87-15708
N87-15712
N87-15715
N87-15720
LANSING, F. L. N87-15351
LANZL, F. N87-15245
LAPSHIN, V. I. N87-15806
LARKIN, JILL H. N87-15696
LAUB, GEORGENE N87-15182
LAUDENSLAGER, JAMES B. N87-15536
LAZRUS, ALLAN L. N87-15541
LE, ANH H. N87-15419
LEE, C. F. N87-15298
LEE, HWA WEON N87-15771
LEE, S. D. N87-15298
LEIGHTON, TOM N87-15733
LEISERSON, CHARLES E. N87-15738
LEMONDS, JEFFREY N87-15477
LENISON, L. B. N87-15852
LEON, BENJAMIN J. N87-15475
LEPERA, MAURICE E. N87-15318
LESH, J. R. N87-15336
LEWIS, JAMES K. N87-15517
LEWIS, THOMAS J. N87-15690
LEWY, S. N87-15178
LI, MING N87-15732
LI, VICTOR C. N87-15655
N87-15657
N87-15663
N87-15743
N87-15744
LIEBOWITZ, JAY N87-15724
LIETH, H. N87-15572
LIEWER, K. M N87-15357
LIN, L. S. N87-15491
LINDSEY, W. C. N87-15391
LIPUNOV, V. M. N87-15797
LITVIN, F. L. N87-15466
LITVINCHUK, A. A. N87-15845
LIU, DAVID C. N87-15305
LIU, HUA-KUANG N87-15413
LIU, Z. N87-15437
LOBB, V. B. N87-15351
LOFTON, ELIZABETH P. N87-15434
LOK, M. F. N87-15387
LOMADZE, R. D. N87-15841
LOMINADZE, D. G. N87-15829
N87-15858
LOMINADZE, J. G. N87-15840
N87-15854
N87-15862
N87-15869
N87-15873
N87-15875
LONGPRE, LUC N87-15732
LOPEZ, RAMON E. N87-15929
LOUCKS, CLIFFORD S. N87-15469
LOWE, STEPHEN R. N87-15230
LUCIANI, J. F. N87-15795
LUCIUS, CHARLES N87-15204
LUKASH, V. N. N87-15799
LUTES, G. N87-15330
LUTZ, E. N87-15370
LYNCH, NANCY N87-15901

M

MACCONOCHIE, IAN O. N87-15259
N87-15277
MACEK, W. N87-15818
MACHABELI, G. Z. N87-15849
MACPHERSON, J. I. N87-15598
MAGGI, P. N87-15856
MAGNANI, PIERGIOVANNI N87-15472
MAHRT, L. N87-15555
MAISEL, MARTIN N87-15182
MALLOUK, THOMAS E. N87-15432
MAMRADZE, P. G. N87-15847
MANHEIMER, W. M. N87-15877
MANN, TIMOTHY P. N87-15725
MANNINEN, M. N87-15887
MANNSTEIN, HERMANN N87-15592
MANOUSOYANNAKI, IOANNA N87-15913
MANSCHKE, ANDREAS N87-15636
MANSON, STEVEN T. N87-15779
MAO, N. N87-15455
MARACCHI, G. N87-15595
N87-15621
MARCHENKO, V. A. N87-15863
MARKGRAF, S. A. N87-15309
MARKOV, V. S. N87-15821
MARKWITZ, W. N87-15247
MARLIN, H. N87-15344
MARSHALL, W. K. N87-15333
MARTELLACCI, C. N87-15596
MARTIN-PASCUAL, C. N87-15373
MARUYAMA, XAVIER K. N87-15457
MASON, I. M. N87-15588
MASUDA, TATSUYA N87-15761
MATSUDA, TAKASHI N87-15317
MATTHEWS, ELAINE N87-15571
MAXWELL, E. L. N87-15668
MAYER, G. N87-15247
MCALISTER, K. W. N87-15185
MCBEAN, GORDON N87-15548
MCCALL, R. C. N87-15456
MCCROSKEY, W. J. N87-15181
N87-15182
MCCUMBER, M. N87-15557
MCDANIEL, S. T. N87-15776
MCDERMID, I. STUART N87-15536
MCELRATH, T. P. N87-15356
MCMAHAN, ROBERT KENNETH N87-15918
MCMAHON, H. M. N87-15190
MEASURES, R. M. N87-15482
MECHANIC, GERALD L. N87-15683
MEERKOETTER, RALF N87-15648
MEHLMAN, G. N87-15879
MEHRABZADEH, A. A. N87-15532
N87-15542
MEIER, H. U. N87-15167
MEINKE, P. N87-15366
MELESHKO, V. P. N87-15546
MELHEM, RAMI G. N87-15727
MELICE, J. L. N87-15579
MELIKHOV, V. R. N87-15921
MELIKIDZE, G. I. N87-15849
MELROSE, D. B. N87-15839
MENENTI, M. N87-15628
MENETI, M. N87-15611
MERCIER, J. L. N87-15625
MERRICK, W. D. N87-15351
MESZAROS, P. N87-15857
METSCHER, B. D. N87-15334
METZIG, G. N87-15647
MEYER, WALTER N87-15652
MEYER, WERNER R. N87-15311
MICHEL, R. N87-15188
MIELKE, E. W. N87-15897
MIGLIETTA, F. N87-15621
MIKHAIL, AMEER G. N87-15255
MIKHAILOVSKII, A. N87-15864
N87-15865
MIKSOVSKY, MIROSLAV N87-15505
MIKULAS, MARTIN M., JR. N87-15259
MILEANT, A. N87-15349
MILFORD, J. R. N87-15587
N87-15609
MILLER, C. D. N87-15297
MILLER, D. L. N87-15426
MILLS-CURRAN, W. C. N87-15735
MINKOFF, M. N87-15736
MINOR, J. E. N87-15316
MINTZ, Y. N87-15558
MIRONOV, YU. V. N87-15921
MITANI, YASUNORI N87-15762
MITCHELL, J. F. B. N87-15568
MIWA, H. N87-15237
MIYAKODA, TSUYAKO N87-15756
MIYOSHI, KAZUHISA N87-15305
MIZIOLEK, ANDRZEJ W. N87-15463
MOHAMED, ABDELKRIM BEN N87-15597
MOISEEV, S. S. N87-15859
MONTENY, B. A. N87-15608
MONTES, C. N87-15838
MONTGOMERY, S. T. N87-15436
MORCRETTE, JEAN-JACQUES N87-15578
MORIZUMI, N. N87-15695
MOROOKA, HIDEYUKI N87-15770
MOROZOV, N. M. N87-15866
MORRISON, ANDREW D. N87-15862
MOTTINGER, N. A. N87-15354
MUELLER, R. N87-15166
MUELLERSCHOEN, R. J. N87-15358
MULLISEN, RONALD N87-15271
MUMFORD, J. H. N87-15339
MUNAKATA, KOICHI N87-15761
MUNNS, THOMAS N87-15279
MURAKAMI, YOSHISHIGE N87-15762
MURTHY, A. V. N87-15187
MURUSIDZE, I. G. N87-15868
MUSHER, S. L. N87-15860
N87-15861

N

NACKE, G. N87-15642
NAGATA, SHUNSUKE N87-15763
NAKA, TOSHIHIRO N87-15768
NAKAHARA, YASUAKI N87-15784
NAKATSUKA, MASAHIRO N87-15767
NAMKUNG, W. N87-15430
NANAYAKKARA, S. D. F. C. N87-15618
NANOBASHVILI, J. I. N87-15862
NATAN, MICHAEL J. N87-15432
N87-15454
NEBOLSINE, P. E. N87-15667
NEFF, R. E. N87-15270
NEIGHBOURS, JOHN R. N87-15457
NEKHIN, SERGEY S. N87-15506
NELSON, JEREMIAH I. N87-15684
NELSON, R. S. N87-15491
NEMEC, J. N87-15570
NEWMAN, D. A. N87-15879
NEWMAN, SANDRA ZEILER N87-15476
NEWNHAM, R. E. N87-15309
NG, WING-FAI N87-15441
NGUYEN VAN HIEU N87-15895
NICHOLSEN, S. E. N87-15602
NICKERSON, J. A. N87-15347
NIKI, HIDEAKI N87-15769
NIKITOPOULOS, DIMITRIS N87-15438
NISHIDA, TAKAHIKO N87-15784
NISHIDA, TOSHIO N87-15757
NISHIGUCHI, KIMIYUKI N87-15759
NITSCHE, W. N87-15171
NIXON, CHARLES W. N87-15699
NJOKU, ENI G. N87-15593
NODOP, KATRIN N87-15650
NORDBURY, J. R. N87-15389
NORED, DONALD L. N87-15267
NORMAN, JOHN M. N87-15516
NORMAN, THOMAS R. N87-15179
NUTTALL, ALBERT H. N87-15405

O

OBRIEN, R. J. N87-15532
N87-15542
OETTL, H. N87-15241
OHI, FUMIO N87-15757
OHJI, TAKAYOSHI N87-15759
OHMURA, A. N87-15560
OHRING, G. N87-15575
OHSAWA, Y. N87-15827
OJO, O. N87-15603
OKAMOTO, S. N87-15283
OLESEN, S. N87-15651
OLIVE, K. A. N87-15923
OLORY-HECHINGER, E. N87-15625
OLORY, P. N87-15625
OLSON, J. M. N87-15521
OLSON, RICHARD J. N87-15473
OLTMANS, S. J. N87-15675
ONG, E. T. N87-15522
ONISHCHENKO, O. N87-15864
N87-15865
ORAEVSKY, V. N. N87-15837
N87-15852
ORAN, ELAINE N87-15229
ORISHICH, A. M. N87-15798
OSTROGORSKY, A. G. N87-15314
OTENGI, SILVERY B. B. N87-15607
OTTERMAN, J. N87-15557
OWENS, EDWIN C. N87-15318

P

PACIEJ, RICHARD C. N87-15294
PALOSCIA, S. N87-15589
PALUMBO, DANIEL L. N87-15722
PAMPALONI, P. N87-15589
PAN, H.-L. N87-15555
PANDA, BRAHMANANDA N87-15201
PANFILOVICH, ANATOLY I. N87-15507
PANT, N. N87-15249
PAPKE, W. N87-15370
PAPPERT, R. A. N87-15397
PARASKEVOPOULOS, S. N87-15623
PARKER, JOHN A. N87-15304
PARKS, VINCENT J. N87-15493
PARRIS, R. R. N87-15902
PASINETTI, L. E. N87-15856
PATARAYA, A. D. N87-15809
N87-15851
PATARAYA, D. N87-15816
PATEL, INDU R. N87-15593
PAULK, BETTY DOUGLAS N87-15899
PAULSON, JOHN W., JR. N87-15180
PAVESI, B. N87-15363
PAVLOV, G. G. N87-15846
N87-15847
PECKHAM, R. J. N87-15272
PELLAT, R. N87-15795
PENNINGTON, JACK E. N87-15259
PERALA, RODNEY A. N87-15407
PERDUE, THOMAS O. N87-15446
PEREZ-DE-TEJADA, H. N87-15820
PERNER, D. N87-15531
PERNOT, MARC N87-15508
PERRING, S. N87-15497
PETNIASHVILI, V. I. N87-15862
PETRI, R. J. N87-15522
PETVIASHVILI, V. I. N87-15863
PINTY, B. N87-15653
PIPER, L. G. N87-15667
PIPER, ROBERT B. N87-15206
PLANTON, SERGE N87-15563
PLATT, U. N87-15530
PLICHTA, EDWARD J. N87-15429
PLOECHINGER, E. N87-15370
POGUTSE, O. P. N87-15866
POKHOTELOV, O. A. N87-15863
POLLARD, H. E. N87-15270
PONOMARENKO, A. G. N87-15798
POSNER, E. C. N87-15329
POSUKH, V. G. N87-15798
POUCH, JOHN J. N87-15305
POVINELLI, LOUIS A. N87-15173
PREMKUMAR, R. I. N87-15354
PRIJ, J. N87-15483
PROCTOR, T. M. N87-15778
PRONIN, A. A. N87-15926
PTUSKIN, V. S. N87-15833

Q

QUENZEL, HEINRICH N87-15630

R

RADPARVAR, M. N87-15885
RADTKE, MIKE N87-15679
RAEDLER, K.-H. N87-15876
RAFFAELLI, G. N87-15856
RAFFY, M. N87-15625
RAHMAT-SAMII, Y. N87-15339
RAJAN, Y. S. N87-15241
RAJU, I. S. N87-15490
RAJU, M. S. N87-15447
RAMSTEDT, C. F. N87-15417
RAND, STEPHEN C. N87-15787
RANGANATH, B. K. N87-15622
RANZINGER, MONIKA N87-15509
RAPLEY, C. G. N87-15588
RASCHKE, E. N87-15576
N87-15631
RASCHKE, ERHARD N87-15630
RASOOL, S. I. N87-15545
RAWLINS, W. T. N87-15667
REBSTOCK, RAINER N87-15235
REDDY, K. C. N87-15443
N87-15745
REICHMUTH, J. N87-15781
REINHARDT, E. R. N87-15639
REUTER, D. N87-15573
RHIND, DAVID N87-15510
RICCITIELLO, SALVATORE R. N87-15275

RICE, JAMES R. N87-15655
RIEBE, GREGORY D. N87-15184
RIELAND, M. N87-15576
N87-15637
RIESTER, EGBERT N87-15225
RIGGS, R. L. N87-15352
RITTERS, KURT N87-15473
RIPIN, B. H. N87-15877
N87-15660
ROBB, JOHN D. N87-15407
ROBBLEE, LOIS S. N87-15690
ROBERTS, J. B. N87-15470
ROBICHAUX, LEONARD M. N87-15278
ROBINSON, D. L. N87-15334
N87-15336
ROBINSON, S. E. N87-15345
ROCHBLATT, D. J. N87-15339
ROCK, JOHN N87-15681
RODEMICH, E. R. N87-15332
N87-15341
RODGERS, M. O. N87-15533
ROEDERER, A. N87-15377
ROGARD, R. N87-15368
ROLFE, ERICA N87-15544
ROS, W. N87-15367
ROSEMA, A. N87-15826
ROSENGREEN, A. N87-15474
ROTH, MARK A. N87-15729
ROWE, JOSEPH E. N87-15679
ROWLAND, F. SHERWOOD N87-15538
ROWLAND, VERNON N87-15689
ROWNTREE, P. R. N87-15569
ROYER, ALAIN N87-15617
ROZELOT, J. P. N87-15601
RUBENCHIK, A. M. N87-15660
RUBINCAM, DAVID PARRY N87-15665
RUCH, WOLFGANG N87-15295
RUEHLE, M. N87-15302
RUPRECHT, E. N87-15642
RUSBRIDGE, K. L. N87-15497
RUZMAIKIN, A. A. N87-15871
N87-15874
RYNASKI, EDMUND G. N87-15234
RYNKOWSKI, A. N87-15437
RYUTOVA, M. P. N87-15803

S

SACCO, V. N87-15621
SAGDEEV, R. Z. N87-15835
N87-15836
SAHU, JUBARAJ N87-15191
N87-15448
SAITO, K. N87-15437
SAKAI, J. N87-15811
SAKAI, JUN-ICHI N87-15804
SAKAKIBARA, S. N87-15237
SAKURAI, MAKOTO N87-15757
SALGE, FRANCOIS N87-15506
SALMOND, D. J. N87-15752
SALMONSEN, RICHARD B. N87-15690
SALOMON, MARK N87-15429
SANDERS, DONALD C. N87-15680
SANDWELL, D. T. N87-15660
SANGSTER, A. B. N87-15569
SANJANA, Z. N. N87-15280
SARGENT, MURRAY, III N87-15458
SARRAFIAN, SHAHAN K. N87-15234
SARTON, L. A. J. N87-15486
SASTRY, C. N. N87-15813
SATO, M. N87-15237
SATOH, KUNIHIKO N87-15758
SAUER, K. N87-15819
SAVSHINSKIY, V. A. N87-15418
SCARF, F. L. N87-15926
SCATTERGOOD, THOMAS W. N87-15927
SCHAFFAR, M. N87-15775
SCHARTEN, TH. N87-15694
SCHAYES, G. N87-15599
SCHIFF, H. I. N87-15543
SCHINDLER, K. N87-15925
SCHINELLI, BRUCE G. N87-15910
SCHIPPER, LEON JAY N87-15917
SCHMETZ, P. N87-15637
SCHMIDT, W. N87-15228
SCHMITT, V. N87-15165
SCHMITZ, F. H. N87-15178
SCHMUGGE, T. J. N87-15629
SCHNEIDER, WILLIAM C. N87-15260
SCHNEITER, GEORGE R. N87-15909
SCHOEN, ROBERT J. N87-15702
SCHOENDORF, J. F. N87-15491
SCHOENFELD, W. P. N87-15404
SCHRA, L. N87-15488
SCHROEDER, KLAUS JUERGEN N87-15315
SCHROEDER, PAUL N87-15315
SCHUEPP, P. H. N87-15586
SCHULTZ, D. L. N87-15220
N87-15221
SCHULTZ, K. J. N87-15178
SCHWAB, R. W. N87-15197
SCHWARTZ, DANIEL A. N87-15931
SCHWARTZ, IRA B. N87-15790
SCHWARZMAIER, G. N87-15649
SCHWARZMANN, P. N87-15639
SEDRAKYAN, D. M. N87-15853
SEEHAFER, N. N87-15812
SEGUIN, B. N87-15591
SELDEN, DAVID D. N87-15734
SELLERS, P. J. N87-15558
N87-15629
SEMIKOZ, V. B. N87-15637
SEMUSHIN, S. A. N87-15444
SENDA, TOMIO N87-15760
SENTURIA, STEPHEN D. N87-15308
SETHURAMAN, JAYARAM N87-15746
SHABAD, A. E. N87-15848
SHAH, ARVIND H. N87-15494
SHAO, H. M. N87-15340
SHAO, MICHAEL N87-15788
SHAPIRO, I. YA N87-15660
SHAPIRO, LIONEL R. N87-15696
SHAPIRO, V. D. N87-15835
N87-15836
SHARON, ANTHONY P. N87-15728
SHAROV, G. S. N87-15834
SHEA, THERESA V. N87-15423
N87-15425
N87-15427
SHEALY, D. L. N87-15915
SHEN, B. Z. N87-15637
SHEN, HE-SHENG N87-15890
SHEPPARD, NORMAN F., JR. N87-15308
SHEVCHENKO, V. I. N87-15836
SHIM, GUNCHOO N87-15296
SHIMADA, SHOICHI N87-15770
SHIRAFUJI, JUNJI N87-15763
SHIRAISHI, TAKETORA N87-15765
SHIRAKAWA, KAZUHIRO N87-15763
SHOENBERGER, JAMES E. N87-15238
SHOR, PETER N87-15733
SHOSTAK, ARNOLD N87-15431
SHUKLA, P. K. N87-15868
SHUKUROV, A. M. N87-15871
SIDI, JACQUELINE N87-15707
SIEGEL, MICHAEL N87-15901
SILANTIEV, N. A. N87-15800
SILIN, V. P. N87-15867
SILVEIRA, V. L. R. N87-15696
SIMON, M. K. N87-15349
SIMONETT, DAVID N87-15518
SINGH, HANWANT B. N87-15537
SINGH, T. N87-15244
SKOV, RANDALL A. N87-15673
SLATER, PHILIP N. N87-15594
SLOBIN, S. D. N87-15350
SMITH, BRIAN N87-15279
SMITH, DIANE K. N87-15454
SMITH, E. K. N87-15359
SMITH, H. K. N87-15347
SNIDE, JAMES A. N87-15310
SNYDER, F. P. N87-15400
SOBIESZCZANSKI-SOBIESKI, JAROSLAW N87-15205
SOEGAARD, HENRIK N87-15618
SOHN, JEONG LAK N87-15266
SOJKA, J. J. N87-15656
SOKHADZE, Z. A. N87-15869
SOKOLOFF, D. D. N87-15871
N87-15874
SOLLFREY, WILLIAM N87-15394
SOREK, S. N87-15622
SOULIE, N. N87-15369
SPAIN, E. H. N87-15398
SPATCHEK, K. H. N87-15248
SPATSCHEK, K. H. N87-15802
N87-15868
SPICER, THOMAS O. N87-15526
SPLETTSTOESSER, W. R. N87-15178
STAMNES, KNUT N87-15580
STANEWSKY, E. N87-15169
STANLEY, ANN E. N87-15888
STARKE, E. A., JR. N87-15295
STARKS, PATRICK N87-15516
STARR, GREGORY P. N87-15469
STATMAN, J. N87-15342
STEDMAN, D. H. N87-15540
STEELE, JOHN P. H. N87-15469
STEFANOV, B. N87-15881
STEIN, H. J. N87-15894
STEINHOFF, J. N87-15745
STELLINGWERF, R. N87-15880
STELZRIED, C. N87-15353
N87-15355
STEPANOV, K. H. N87-15806
STEPHANAKIS, S. J. N87-15879
STERN, RICHARD A. N87-15422
STEVENS, CHARLES M. N87-15539
STEVENS, R. N87-15352
STEWART, JAMES J. N87-15313
STILES, MARK D. N87-15780
STOCK, MICHAEL J. N87-15699
STOECKL, H. N87-15496
STOFFEL, T. L. N87-15668
STOLLER, F. W. N87-15351
STOTTS, LARRY B. N87-15406
STRATTON, A. N87-15511
STRAUB, B. N87-15639
STRAUB, F. K. N87-15175
STREET-PERROTT, F. A. N87-15586
STUHLMANN, R. N87-15640
STUM, J. N87-15663
SU, Y. T. N87-15391
SUD, Y. C. N87-15558
SUGIHARA, R. N87-15811
SUGIMOTO, RYU-ICHI N87-15764
SUSSKIND, J. N87-15573
SUTER, ULRICH W. N87-15311
SUTTON, A. P. N87-15302
SWANSON, JON T. N87-15313
SWARD, D. J. N87-15387
SYNTNIKOV, V. N. N87-15798
SZEGO, K. N87-15836

T

TABAKOFF, W. N87-15232
TACHIBANA, TAKESHI N87-15317
TACONET, O. N87-15554
TADA, K. N87-15551
TAGUCHI, TSUNEMASA N87-15766
TAJIMA, T. N87-15811
TAJIMA, TOSHIKI N87-15804
TAKAHARA, F. N87-15830
TAKAHARA, FUMIO N87-15794
TAKAHASHI, R. K. N87-15185
TAKEDA, TETSUYA N87-15768
N87-15769
TAKTAKISHVILI, A. L. N87-15810
TALBOT, L. N87-15290
TAM, L. T. N87-15442
TAMURA, HIDEO N87-15772
TAN, H. H. N87-15332
TAPLEY, B. D. N87-15660
TAYLOR, ALLAN H. N87-15464
TAYLOR, ARTHUR N87-15441
TAYLOR, B. F. N87-15585
TAYLOR, L. M. N87-15735
TAYLOR, T. H. N87-15686
TAYLOR, W. N87-15791
TEETER, RONALD N87-15679
TELSCHOW, K. L. N87-15300
TEREZ, E. I. N87-15842
THACKERAY, JAMES W. N87-15434
N87-15454
THEJAPPA, G. N87-15813
THOMAS, EDWIN L. N87-15307
THOMAS, GERALD B. N87-15693
THOMPSON, JOHN A. N87-15274
THOMSON, D. W. N87-15776
THUENKER, R. N87-15171
TISCHER, A. E. N87-15268
TONN, W. N87-15583
TORENVLIET, LEEN N87-15750
TOSUNOGLU, L. SABRI N87-15700
TOWNE, CHARLES E. N87-15173
TOWNSEND, LAWRENCE W. N87-15782
TOYODA, MASAO N87-15758
TREIMAN, ALLAN H. N87-15922
TREVES, A. N87-15801
TROWBRIDGE, D. L. N87-15346
TRUONG, T. K. N87-15340
TRZCINSKI, EDMUND N87-15265
TSAI, CHEN S. N87-15789
TSANG, C. S. N87-15391
TSAY, C.-B. P. N87-15486
TSIKARISHVILI, E. G. N87-15854
N87-15858
TSINTSADZE, N. L. N87-15868
TSKHAKAYA, D. D. N87-15868
TSOLAKIDIS, COSTAS N87-15600
TSUJI, KIICHIRO N87-15762
TSUNG, W.-J. N87-15466
TSYTOVICH, V. N. N87-15826
N87-15840
TUOZZI, A. N87-15363
TUZET, ANDREE N87-15632

TWARDOCH, URSZULA M. N87-15328
TZENG, WEN-SHI N87-15282

U

UHM, H. S. N87-15430
UHRAN, M. L. N87-15320
UHUAD, GENEROSO C. N87-15231
ULFERS, BERNARD G. N87-15288
UMAN, S. D. N87-15418
URBAN, B. N87-15553
URSOV, V. N. N87-15867
USOV, V. V. N87-15848

V

VAESSEN, G. H. G. N87-15480
VALANIS, K. C. N87-15298
VALLABHAN, C. V. G. N87-15316
VALSASINA, G. B. N87-15374
VANAMELSFORT, A. M. J. N87-15694
VANDENBERG, B. N87-15170
VANDENHOF, P. M. J. N87-15751
VANDEREIKHOFF, J. N87-15483
VANDIEPEN, N. W. P. N87-15719
VANEMDEBOAS, PETER N87-15750
VANLEEUWEN, H. P. N87-15488
VANRENS, J. H. P. N87-15368
VANSELOW, RALF N87-15287
VANWORTEL, J. C. N87-15485
VASILYEV, V. P. N87-15806
VASSALLO, J. N87-15373
VEEFKIND, A. N87-15881
VEKSTEIN, G. E. N87-15824
VERHOOG, ARD N87-15707
N87-15709
N87-15710
N87-15719
N87-15720
VERMA, SHASHI B. N87-15516
VERNUCCI, A. N87-15375
VERUTTIPONG, T. N87-15331
VILAIN, J. N87-15322
N87-15323
VILNROTTER, V. A. N87-15332
N87-15341
VITANYI, PAUL M. N87-15731
N87-15732
N87-15740
VLCEK, B. L. N87-15442
VROMAN, NEIL B. N87-15661
VYKUKAL, HUBERT C. N87-15253

W

WACHARAKITTI, S. N87-15614
WAGNER, OTTO C. N87-15421
WAHLGREN, GLENN MICHAEL N87-15912
WALKER, A. C. N87-15791
WALL, L. L. N87-15281
WALTER-SHEA, ELIZABETH N87-15516
WALTERS, ROBERT W. N87-15183
WANG, C. C. N87-15343
WANG, CHARLES C. N87-15534
WANG, S. N87-15686
WARNER, THOMAS T. N87-15669
N87-15670
N87-15671
WARRILOW, DAVID A. N87-15564
N87-15566
WASCHER, L. N87-15701
WEAR, W. O. N87-15320
WEBB, JEFF N87-15204
WEBER, WIGAND N87-15512
WEI, R. P. N87-15296
N87-15297
WEINGARTEN, NORMAN C. N87-15234
WELLS, NIKITA N87-15783
WESSELSKI, CLARENCE J. N87-15260
WHAPHAM, A. D. N87-15497
WHITE, CHARLES W. N87-15262
WHITE, J. N87-15416
WHITE, KENNETH J. N87-15403
WHITE, KOTO N87-15310
WHITE, SYDNEY H. N87-15328
WIEGNER, MATTHIAS N87-15641
WIGGINS, JIM N87-15510
WIGHTMAN, J. P. N87-15312
WILCHER, J. N87-15355
WILKINS, JOHN W. N87-15780
WILLAY, G. N87-15285
WILLIAMS, B. N87-15701
WILLIAMS, CARL E. N87-15693
WILLIAMSON, SAMUEL J. N87-15687
WILLMETS, D. P. N87-15380
WILLMOTT, C. J. N87-15559
WILSKI, INGO N87-15513
WILSON, JOHN W. N87-15782
WILSON, M. F. N87-15562
WILSON, MAYWOOD L. N87-15277
WINKLER, S. N87-15496
WITHINGTON, J. N87-15331
WITTMANN, A. N87-15285
WLODYKA, LOIS N87-15265
WOLD, AARON N87-15890
WOOD, B. N87-15352
WRIGHTON, MARK S. N87-15423
N87-15425
N87-15427
N87-15432
N87-15434
N87-15454
WYATT, BARRY N87-15510

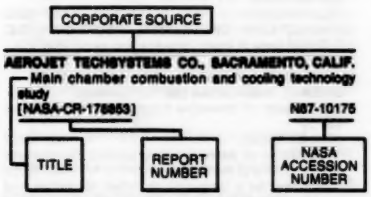
Y

YAMAGUCHI, KATSUHITO N87-15771
YAMANAKA, CHIHIRO N87-15766
YAMANAKA, CHIYOE N87-15767
N87-15768
N87-15769
YAMANAKA, TATSUHIKO N87-15768
N87-15769
YAMAZAKI, K. N87-15565
YANG, ANDREW T. N87-15424
YANIV, G. N87-15492
YAO, GUANG-QING N87-15890
YARIV, AMNON N87-15461
YATES, ROY D. N87-15409
YEH, H.-G. N87-15360
YEH, Y. C. N87-15520
YLO, E. N87-15309
YOKOYAMA, KEIJI N87-15760
YONEYAMA, HIROSHI N87-15772
YOSHIDA, TOYOAKI N87-15217
N87-15218
YOSHIDA, YASUHIKO N87-15759
YOSHIKAWA, AKIRA N87-15771
YOSHINO, KATSUMI N87-15764
N87-15765
YOUNG, F. C. N87-15879
YOUNG, I. N87-15383
YOUNGBLOOD, W. W. N87-15320

Z

ZAKHAROV, YU. P. N87-15798
ZARETSKY, ERWIN V. N87-15467
ZARKOVA, L. N87-15881
ZEDGINIDZE, M. Z. N87-15851
ZELENY, L. M. N87-15793
N87-15810
N87-15815
N87-15823
ZELL, L.-O. N87-15815
ZHELEZNYAKOV, V. V. N87-15845
ZHUGZADA, YU D. N87-15805
ZHVANIA, B. P. N87-15882
ZIMMERMANN, RICHARD E. N87-15193
ZISSA, D. E. N87-15916
ZUBER, MARIA THERESA N87-15925
ZUCKERBROD, DAVID N87-15415
ZYBIN, K. P. N87-15834

Typical Corporate Source Index Listing



Listings in this index are arranged alphabetically by corporate source. The title of the document provides the user with a brief description of the subject matter. The report number helps to indicate the type of document cited (e.g., NASA report, translation, NASA contractor report). The NASA accession number denotes the number by which the citation is identified. The titles are arranged under each corporate source in ascending accession number order.

A

ABASTUMANI ASTROPHYSICAL OBSERVATORY, GEORGIA (USSR).
Propagation of nonlinear modulated Alfven waves in spicules and magnetic flux tubes N87-15809
Merging instability of magnetic islands N87-15810
Investigation on the intensity progression of F-region nightglow emission of the oxygen red line by means of atmospheric gravity waves soliton N87-15816
Nonlinear conversion emission mechanisms in the open plasma systems in astrophysics N87-15840
Distortions of power-law of electrons in turbulent plasma reactor N87-15841
The generation of radio waves in the inhomogeneous magnetic field of the pulsar magnetosphere N87-15849
Investigation of subpulse drift in pulsars meaning the Coriolis force and inhomogeneities N87-15851
Wisps in the Crab Nebula N87-15854
Relativistic self-focusing of powerful electromagnetic radiation in plasma N87-15858
Drift vortices in plasma modelled on fast-rotating shallow field N87-15862
The nonlinear turbulent dynamo in the accretion disks of black holes N87-15869
Gas rotation above the galactic disk N87-15873
Model of bimodal behavior of Cygnus X-1 N87-15875

ACADEMIA SINICA, BEIJING (CHINA).
Climatic effect of snowfall anomaly in mid-high latitudes in a one-dimensional air-land model N87-15567

ACADEMY OF SCIENCES, BERLIN (EAST GERMANY).
A fluid simulation of the AMPTE neutral gas release in the solar wind N87-15819

ACADEMY OF SCIENCES, POTSDAM (EAST GERMANY).
Topological stability of magnetic fields in spatial domains with boundaries and finite-length field lines N87-15812
Stochastization of charged particle motion near a magnetic field reversal and the problem of explosive reconnection N87-15823
On the effect of differential rotation on axisymmetric and nonaxisymmetric magnetic fields of cosmic bodies N87-15876

ACADEMY OF SCIENCES OF THE GEORGIAN SSR, TBILISI.
Radiation of ion-acoustic waves by supersonic soliton N87-15868

ACADEMY OF SCIENCES (USSR), GORKY.
Radiation transfer and radiation pressure on plasma by magnetic degenerates N87-15845

ACADEMY OF SCIENCES (USSR), LENINGRAD.
Magnetic fields of hot stars: Observation methods and results N87-15800
Cosmic ray archaeology, solar activity and supernova explosions N87-15831
Quantum effects in synchronization radiation of a plasma in superstrong magnetic fields of neutron stars N87-15846
Two-photon annihilation radiation in strong magnestic field N87-15847
Magnetic field generation in celestial objects N87-15872

ACADEMY OF SCIENCES (USSR), MOSCOW.
Equilibrium and stability of galaxies in binary systems N87-15796
The interaction of rotating magnetized stars with accreting plasma N87-15797
Laboratory simulation of collisionless coupling between supernova remnants and magnetized interstellar medium N87-15798
Cosmions and galaxy formation N87-15799
Oscillations and waves in sunspots N87-15805
Helioseismology and the internal structure of the Sun N87-15807
The critical ionization velocity phenomenon in astrophysics N87-15814
Spontaneous reconnection at the boundaries of planetary magnetospheres N87-15815
Magnetic reconnection, generation of plasma fluxes and accelerated particles in laboratory experiments and space plasma N87-15821
Magnetic boundary and acceleration of charged particles in spatially nonuniform configurations N87-15822
Radiative-resonant acceleration by plasma turbulence N87-15826
Influence of reflected ions on the front structure of quasi-perpendicular collisionless shock waves N87-15829
Hydrodynamics of interstellar medium including cosmic rays N87-15833
Problems of cosmic ray acceleration in giant molecular clouds N87-15834
Injection mechanism for the cosmic ray acceleration by shocks N87-15835
Mass loading and MHD turbulence in the solar wind/comet interaction region N87-15836
Collective interactions of neutrinos with dense astrophysical plasmas N87-15837
Physics of pulsar magnetosphere N87-15844
Bound electron-positron pair creation by gamma-quanta in superstrong magnetic field of pulsars N87-15848
Electrodynamics of inhomogeneous relativistic electron-positron plasma and radio emission of pulsars N87-15850
Gamma-positronium in the magnetosphere of a pulsar N87-15852
Electron nonlinearities and rapid wave processes in cosmic and laboratory plasmas N87-15859
Instability in the system of counterstreaming relativistic plasmas N87-15867
Magnetic fields of spiral galaxies N87-15871

ACADEMY OF SCIENCES (USSR), NOVOSIBIRSK.
On low-hybrid turbulence excited by ion streams N87-15860
Acoustic wave collapse effect on the structure of collisionless shock waves in magnetized plasma N87-15861

ACADEMY OF SCIENCES (USSR), YAKUTSK.
The role of cosmic rays in supernovae shock dynamics N87-15832

AEROSPACE CORP., EL SEGUNDO, CALIF.
A rubidium clock model
[AD-A171133] N87-15773

AEROSPACE MEDICAL RESEARCH LABS., WRIGHT-PATTERSON AFB, OHIO.
Human real time perception in noise
[AD-A172374] N87-15699

AGRICULTURE CANADA, OTTAWA (ONTARIO).
Regional measurements of evapotranspiration using aircraft mounted sensors N87-15598

AIR FORCE ACADEMY, COLO.
MOPAC manual (version 3.10): A general molecular orbital package, IBM-PC version, 1st edition
[AD-A172361] N87-15313

AIR FORCE GEOPHYSICS LAB., HANSCOM AFB, MASS.
Shuttle contamination modeling: Evolution of ionized shuttle exhaust, environmental research papers
[AD-A172276] N87-15257
Quadrupole ion/neutral mass spectrometer for space shuttle applications: Environmental research papers
[AD-A172275] N87-15265
The effect of viewing aspect on climatological cloud distribution
[AD-A170440] N87-15672

AIR FORCE INST. OF TECH., WRIGHT-PATTERSON AFB, OHIO.
An experimental investigation of a circular thrust augmenting ejector
[AD-A172376] N87-15231
The effects of implanted delaminations on the tensile strength of graphite/epoxy laminates
[AD-A171329] N87-15278
A communication bandwidth model for shuffle-exchange and augmented shuffle-exchange interprocessor communication networks
[AD-A171287] N87-15402
Numerical solution of laminar and turbulent boundary layer equations including transition and experimental study of a flat plate with a blunt fin at incidence
[AD-A172409] N87-15450
Nowcasting thermodynamic profiles using a triangle of wind profilers in an advection model
[AD-A171288] N87-15673
The effect of long term monocular occlusion on vernier threshold: Elasticity in the young adult visual system
[AD-A171289] N87-15688
Use of disjunctive response requirements in dual-task environments: Implications for automation
[AD-A171277] N87-15702
The effectiveness of Jackson networks as control variates for queueing network simulation
[AD-A171280] N87-15728
Theory of non-first Norman form relational databases
[AD-A171285] N87-15729
Feasibility and comparison investigation of the use of the Fast Fourier Transform and finite difference method for numerical solution of boundary value problems
[AD-A172719] N87-15749
Investigation of magnetostatic surface waves for anisotropic effects
[AD-A172375] N87-15774
A decision support system for space technology tradeoffs: A microcomputer application
[AD-A172379] N87-15910

AIR FORCE SYSTEMS COMMAND, WRIGHT-PATTERSON AFB, OHIO.
The secret of guided missile re-entry
[AD-A169598] N87-15254
Noises of klystron oscillators of a small power
[AD-A170220] N87-15418

AIR FORCE WRIGHT AERONAUTICAL LABS., WRIGHT-PATTERSON AFB, OHIO.
Carbon residue studies with a micro carbon residue tester
[AD-A171153] N87-15306
Chalcogenide glasses. Part 4: Crystallization and glass transition characteristics in AS(2-x)Sb(x)S(3) glass-forming system
[AD-A171564] N87-15310

ALABAMA UNIV., BIRMINGHAM.
Theoretical analysis of segmented Wolter/LSM X-ray telescope systems
[NASA-CR-178986] N87-15915

ALABAMA UNIV., HUNTSVILLE.
Interactions of coupled acoustic and vortical instabilities in rocket combustion chambers N87-15266

AMES LAB., IOWA.
Vacuum ultraviolet photochemistry
[DE86-015768] N87-15282

AMSTERDAM UNIV. (NETHERLANDS).
Proposal for an algebraic semantics definition formalism. Annexe D4.A3 of deliverable D4 - second review
[CWI-CS-R8504] N87-15719

ANALYTIC SERVICES, INC., ARLINGTON, VA.
The unmanned air reconnaissance system
[AD-A171165] N87-15206
Proceedings of the 40th Anniversary of the Joint Services Electronics Program
[AD-A171610] N87-15431
ANALYTICAL SERVICES AND MATERIALS, INC., HAMPTON, VA.
Simple formulas for strain-energy release rates with higher order and singular finite elements
[NASA-CR-178186] N87-15490
APPLIED SOLAR ENERGY CORP., CITY OF INDUSTRY, CALIF.
Rugged, thin GaAs solar cell development, phase 1
[AD-A171188] N87-15520
ARGONNE NATIONAL LAB., ILL.
The determination of the global average OH concentration using a deuteroethane tracer N87-15539
Approaches to optimization/simulation problems
[DE86-012758] N87-15736
ARIZONA STATE UNIV., TEMPE.
The effects of response modality on interference between stimulus dimensions
[AD-A171177] N87-15697
The use of interactive voice systems to improve multiple-task performance
[AD-A171492] N87-15703
ARIZONA UNIV., TUCSON.
Theoretical studies in free-electron lasers
[AD-A171174] N87-15458
Variations in in-flight absolute radiometric calibration N87-15594
ARKANSAS UNIV., FAYETTEVILLE.
Mathematical modeling and experimental investigation of heavier-than-air gas dispersion in the atmosphere N87-15526
ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND, DOVER, N. J.
NMR (Nuclear Magnetic Resonance) investigations of liquid propellant systems consisting of alkyl- and hydroxyl-ammonium nitrates. Part 1: Characterization of Carbon-13, proton, and Nitrogen-15 NMR spectra and analytical applications
[AD-A171577] N87-15319
ARMY ENGINEER WATERWAYS EXPERIMENT STATION, VICKSBURG, MISS.
Facilities technology application tests: Fuel-resistant pavement sealers
[AD-A171473] N87-15238
ARMY MILITARY PERSONNEL CENTER, ALEXANDRIA, VA.
Investigation of the UHF mobile-radio propagation channel in a temperate-zone forested environment
[AD-A171431] N87-15403

B

BALLISTIC RESEARCH LABS., ABERDEEN PROVING GROUND, MD.
Drag predictions for projectiles at transonic and supersonic speeds
[AD-A171462] N87-15191
Assessment of two fast codes used for preliminary aerodynamic design of guided projectiles
[AD-A171276] N87-15255
Supersonic flow over cylindrical afterbodies with base bleed
[AD-A171461] N87-15448
Photochemical ignition studies. Part 2: Oxygen-atom 2-photon resonance effects
[AD-A172974] N87-15463
BATTELLE COLUMBUS LABS., OHIO.
Handbook. Volume 1: Validation of digital systems in avionics and flight control applications
[DOT/FAA/CT-82/115-VOL-1-REV] N87-15204
Studies and analyses of the Space Shuttle Main Engine: SSME failure data review, diagnostic survey and SSME diagnostic evaluation
[NASA-CR-178993] N87-15268
BATTELLE COLUMBUS LABS., WASHINGTON, D. C.
Defense Mapping Agency advanced raster-to-Vector benchmark testing
[AD-A171575] N87-15734
BOEING COMMERCIAL AIRPLANE CO., SEATTLE, WASH.
An evaluation of descent strategies for TNAV-equipped aircraft in an advanced metering environment
[NASA-CR-178093] N87-15197
BOEING MILITARY AIRPLANE DEVELOPMENT, SEATTLE, WASH.
Failure analysis of composite structure materials
[AD-A172236] N87-15279
BOSTON COLL., CHESTNUT HILL, MASS.
Thermosphere structure variations during high solar and magnetic activity conditions
[AD-A171350] N87-15666
BOSTON UNIV., MASS.
Meteoritic basalts: The nakhlites, their parental magmas, cooling rates, and equivalents on Earth
[NASA-CR-180071] N87-15922
BRISTOL UNIV. (ENGLAND).
An objective monitoring method for African rainfall based on Meteosat VIS and IR images N87-15586
BRITISH AEROSPACE DYNAMICS GROUP, STEVENAGE (ENGLAND).
The role for entropy and information in software reliability
[BAE-ST-30581] N87-15706
BROWN UNIV., PROVIDENCE, R. I.
Transonic controversy and regular perturbation methods for subcritical flows N87-15172
Single-substance, two-phase duct flow: A unified theoretical and experimental study N87-15438
Shear localization in rate and temperature dependent solids N87-15477
Studies of stress and deformation in the Earth's crust: Part 1: Determining the state of stress in the Earth from earthquake focal mechanism data. Part 2: Deformation around the Creede Caldera, San Juan volcanic field, southwest Colorado: Implications for Caldera mechanics N87-15527
Preparation and characterization of several 2-4-V2 stannite single crystals
[AD-A172238] N87-15890
Unstable deformation in layered media: Application to planetary lithospheres N87-15925
BSO/AUTOMATION TECHNOLOGY B.V., UTRECHT (NETHERLANDS).
Establishment of a common environment. Deliverable D1 of task T1 - second review N87-15709
A comparison of two window systems N87-15710

C

CALABAR UNIV. (NIGERIA).
Regional studies with satellite data in Africa on the desertification of the Sudan-Sahel belt in Nigeria N87-15605
CALIFORNIA POLYTECHNIC STATE UNIV., SAN LUIS OBISPO.
Thermal analysis and design of a cooling system for a Mach 14 nozzle
[NASA-CR-180096] N87-15271
CALIFORNIA UNIV., BERKELEY.
Application of Rayleigh scattering to turbulent flow with heat transfer and combustion
[AD-A172934] N87-15290
Josephson effect detectors of microwave and far infrared radiation
[AD-A171539] N87-15889
Structure of the Coma cluster of galaxies N87-15917
CALIFORNIA UNIV., IRVINE.
Measurement of atmospheric HO by a chemical method N87-15538
Exploratory study of the potential effects of exposure to sonic boom on human health. Volume 2: Epidemiological study
[AD-A170953] N87-15686
Minimum points and views for the recovery of 3-dimensional structure
[AD-A171148] N87-15696
Integrated optic modules for multichannel deflection/switching and signal processing
[AD-A171178] N87-15789
CALIFORNIA UNIV., LOS ANGELES.
Characterization of infrared properties of layer semiconductors
[AD-A172692] N87-15893
CALIFORNIA UNIV., SANTA BARBARA.
Canopy reflectance modeling in a tropical wooded grassland
[NASA-CR-180097] N87-15518
CALSPAN ADVANCED TECHNOLOGY CENTER, BUFFALO, N.Y.
Flared landing approach flying qualities. Volume 1: Experiment design and analysis
[NASA-CR-178188-VOL-1] N87-15234
CALSPAN CORP., BUFFALO, N. Y.
Experimental short-duration techniques N87-15209
Garrett TFE-731 hp turbine stage without and with cooling-gas injection N87-15210
Low aspect ratio turbine stage without cooling-gas injection N87-15211
Time-resolved heat flux measurement for the rotor blade of a TFA-731-2 hp turbine N87-15212
CANADIAN CLIMATE CENTRE, SIDNEY (BRITISH COLUMBIA).
The atmospheric boundary layer and its parameterization N87-15548
CARNEGIE-MELLON UNIV., PITTSBURGH, PA.
FEM model of 3D transient temperature and stress fields in welded plates N87-15476
Novice rules for assessing importance in scientific texts
[AD-A171551] N87-15698
CASE WESTERN RESERVE UNIV., CLEVELAND, OHIO.
Attention and preparatory processes in the central nervous system
[AD-A171316] N87-15689
CATHOLIC UNIV. OF AMERICA, WASHINGTON, D.C.
Spatial scale in image detection and recognition
[AD-A171348] N87-15691
CENTER FOR MATHEMATICS AND COMPUTER SCIENCE, AMSTERDAM (NETHERLANDS).
Generation of Interactive Programming Environments (GIPE)
[CWI-CS-R8620] N87-15707
Generation of Interactive Programming Environments (GIPE). Outline of the GIPE project N87-15708
Proposal for a language definition formalism and selection of test cases. Deliverable D4 of task T4 - second review N87-15716
User definable syntax for specification languages. Annexe D4.A1 of deliverable D4 N87-15717
Global outline of an environment generation system. Deliverable D5 of task T5 - second review N87-15720
Partial evaluation and omega-completeness of algebraic specifications. Annexe D5.A1 of deliverable D5 - second review
[CWI-CS-R8501] N87-15721
CENTER FOR NAVAL ANALYSES, ALEXANDRIA, VA.
Implications of the strategic defense initiative for ABM treaty
[AD-A171145] N87-15909
CENTRE DE DEVELOPPEMENT DES TECHNIQUES AVANCEES, ALGER-GARE (ALGERIA).
The fundamental problems for the energy balance study by satellite imagery N87-15590
CENTRE DE RECHERCHES EN PHYSIQUE DE L'ENVIRONNEMENT, ISSY-LES-MOULINEAUX (FRANCE).
Modelisation of evapotranspiration and soil available water over an agricultural region applicable for remote sensing N87-15554
CENTRE NATIONAL D'ETUDES SPATIALES, TOULOUSE (FRANCE).
The LOCSTAR satellite radiopositioning system N87-15386
CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE, STRASBOURG (FRANCE).
Design of a data base system for inferring land surface parameters and fluxes from satellite radiances N87-15625
CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE, VERRIERES-LE BUISSON (FRANCE).
Effects of regional-scale diurnal variations on the radiation balance of the Earth-atmosphere system N87-15634
CENTRE NATIONAL DE RECHERCHES METEOROLOGIQUES, TOULOUSE (FRANCE).
Sensitivity of the annual cycle simulated by a General Circulation Model (GCM) to a change in land surface albedo N87-15583
Hydrological atmospheric pilot experiment (HAPEX) 86 N87-15627
CINCINNATI UNIV., OHIO.
Study of particulated flows and erosion in turbomachinery
[AD-A172965] N87-15232
An endochronic rate-sensitive constitutive equation for metals: Application to generalized creep
[AD-A172705] N87-15298
CLERMONT-FERRAND UNIV. (FRANCE).
Estimate of broadband conversion factors for the Meteosat VIS channel N87-15653
COLOGNE UNIV. (WEST GERMANY).
Inference of the shortwave radiation at ground from International Satellite Cloud Climatology Project (ISCCP) data sets N87-15576
Radiation and clouds: A summary of international and national activities N87-15631
Global and atmospheric radiation at ground from satellite data N87-15637
Temporal, spectral, and spatial samplings: Problem in radiation budget measurements N87-15640
An approach to derive the radiation budget over the Sahara N87-15641
Derivation of surface properties from satellite observations N87-15642
The modulation transfer of the Airborne Version of the Conical Scan Radiometer (AVCSR) N87-15654

COLORADO UNIV., BOULDER.
Ultrasonic scattering and nondestructive evaluation of defects
[AD-A172258] N87-15494
COLUMBIA UNIV., NEW YORK.
Nonlinear partial differential equations and related problems of pade approximations
[AD-A172253] N87-15748
COMMISSION OF THE EUROPEAN COMMUNITIES, BRUSSELS (BELGIUM).
Overview of major hazards research. Part 1: Of risk and all that N87-15322
Overview of major hazards. Part 2: Source term; dispersion; combustion; blast, missiles, venting; fire; radiation; runaway reactions; toxic substances; dust explosions N87-15323
COMMITTEE ON APPROPRIATIONS (U. S. SENATE).
Department of Housing and Urban Development, and certain independent agencies appropriations for fiscal year 1987, part 2
[S-HRG-99-707-PT-2] N87-15906
National Aeronautics and Space Administration N87-15907
National Aeronautics and Space Administration N87-15908
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION (U. S. SENATE).
NASA authorizations, fiscal year 1987
[GPO-61-975] N87-15904
COMMITTEE ON SCIENCE AND TECHNOLOGY (U. S. HOUSE).
Investigation of the Challenger accident, volume 1
[GPO-64-295] N87-15256
H.R. 4932: To amend land remote sensing commercialization
[GPO-64-491] N87-15515
H.R. 4316 and H.R. 3112: Inventions in outer space
[GPO-64-528] N87-15905
CONNECTICUT UNIV., STORRS.
Optimization of continuum structures using a boundary element formulation N87-15705
CONSIGLIO NAZIONALE DELLE RICERCHE, FLORENCE (ITALY).
Contribution of passive microwave remote sensing in soil moisture and evapotranspiration measurements N87-15589
Evaluation of the geostationary satellite images ground resolution N87-15595
An integrated system to assess agricultural productivity N87-15621
COPENHAGEN UNIV. (DENMARK).
Variation in surface albedo and energy-balance in an arctic/subarctic environment N87-15616
CORNELL UNIV., ITHACA, N.Y.
Evolving ideas on the boundary layer concerning regional evaporation N87-15550
Mountain building processes in the Central Andes
[NASA-CR-180069] N87-15661
Inelastic gas-surface scattering. Part 2: Results
[AD-A171587] N87-15780
Interatomic interactions in solids: An effective medium approach
[AD-A171518] N87-15887

D

DARTMOUTH COLL., HANOVER, N.H.
Automatic parameterization and analysis of stellar atmospheres: A study of the DA white dwarfs N87-15918
DAYTON UNIV., OHIO.
Computational fluid dynamic studies of certain ducted bluff-body flowfields relevant to turbojet combustors. Volume 2: Time-averaged flowfield predictions for a proposed centerbody combustor
[AD-A171169] N87-15447
Optical processing
[AD-A172362] N87-15791
DEFENSE TECHNICAL INFORMATION CENTER, ALEXANDRIA, VA.
Systematic corporate planning at DTIC (Defense Technical Information Center)
[AD-A171525] N87-15902
Subject categorization guide for defense science and technology
[AD-A172650] N87-15903
DELAWARE UNIV., NEWARK.
A representation of the terrestrial biosphere for use in global climate studies N87-15559
DENVER UNIV., COLO.
Detecting and monitoring crack growth in austenitic and ferritic steels
[DE86-014348] N87-15299
Peroxy radical detection by chemical amplification (PERCA) N87-15540
DEPARTMENT OF COMMUNICATIONS, OTTAWA (ONTARIO).
Modulation and voice coding for mobile satellite applications N87-15378
DEPARTMENT OF ENERGY, WASHINGTON, D. C.
Current- and lattice-matched tandem solar cell
[DE86-013757] N87-15521
DEPARTMENT OF THE AIR FORCE, WASHINGTON, D.C.
Method and apparatus for increasing service life of augmentor and combustion chamber liners
[AD-D012443] N87-15273
Thermal vacuum heater array apparatus
[AD-D012436] N87-15420
Nonlinear optical apparatus using optical fibers
[AD-D012439] N87-15787
DEPARTMENT OF THE ARMY, WASHINGTON, D. C.
Aircraft collision warning system
[AD-D012463] N87-15199
Highly decoupled cosited antennas
[AD-D012446] N87-15399
Method of increasing the useful life of rechargeable lithium batteries
[AD-D012444] N87-15421
Millimeter wave microstrip circulator utilizing hexagonal ferrites
[AD-D012445] N87-15422
Cathode including a non fluorinated linear chain polymer as the binder, method of making the cathode, and lithium electrochemical cell containing the cathode
[AD-D012464] N87-15429
Laser-induced chemical vapor deposition of germanium and doped-germanium films
[AD-D012462] N87-15888
DEPARTMENT OF THE NAVY, WASHINGTON, D. C.
Apparatus for determining the liquid water content of a gas
[AD-D012453] N87-15288
Stibine filter for antimonial lead acid batteries
[AD-D012427] N87-15419
Printed circuit card hybrid
[AD-D012448] N87-15428
Microwave pulse compression in dispersive plasmas
[AD-D012426] N87-15877
DEPARTMENT OF TRADE AND INDUSTRY, STEVENAGE (ENGLAND).
Frequency spectrum allocation for a potential land mobile-satellite service N87-15380
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, BRUNSWICK (WEST GERMANY).
The influence of transition strips on the pressure distribution on transonic profiles N87-15166
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, COLOGNE (WEST GERMANY).
Colloquium about Joint Projects within the DFVLR/ISRO Cooperation
[DFVLR-MITT-86-16] N87-15240
Computer networking N87-15250
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, GOETTINGEN (WEST GERMANY).
Development of an artificial boundary layer for different outlet flows N87-15167
Transition fixing and simulation of high Reynolds number flow at transonic velocities N87-15169
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, OBERPFAFFENHOFEN (WEST GERMANY).
Status of ISRO/DFVLR cooperation N87-15241
SABREX: A 90 GHz radiometer experiment on a Rohini satellite N87-15243
Presentation of the status of the experiment Monocular Electro-Optical Stereo Scanner (MEOSS) N87-15245
A flight demonstration program on space data handling N87-15246
APC: A concept demonstration of end-to-end packetized data transportation techniques N87-15247
Land mobile satellite communications: Channel model, modulation, and error control N87-15370
Determination of the albedo of inhomogeneous land surfaces N87-15582
Vegetation index and surface temperature in a mesoscale climate model N87-15592
DIRECTION DE LA METEOROLOGIE NATIONALE, PARIS (FRANCE).
The initialization and use of prognostic land-surface values in the French operational forecast system N87-15553
DIRECTION GENERALE DES TELECOMMUNICATIONS, PLEUMEUR-BODOU (FRANCE).
Activities of the European Conference of Posts and Telecommunications (CEPT) special Group on Mobile Communications (GSM) N87-15385
DREXEL UNIV., PHILADELPHIA, PA.
Computer facilities for high-speed data acquisition, signal processing and large scale system simulation
[AD-A170935] N87-15737
DUESSELDORF UNIV. (WEST GERMANY).
Vortices in magnetized plasmas N87-15802
DURHAM UNIV. (ENGLAND).
Vegetation index models for the assessment of vegetation in marginal areas N87-15584

E

ECOLE NORMALE SUPERIEURE, PARIS (FRANCE).
Two years of the International Satellite Land-Surface Climatology Project (ISLSCP) N87-15545
ECOLE POLYTECHNIQUE, PALAISEAU (FRANCE).
Kinetic equation for Hamiltonian systems integrable in the mean field approximation N87-15795
EIC, INC., NORWOOD, MASS.
An investigation of the electrode kinetics and electrochemistry of refractory metal deposition
[AD-A171410] N87-15328
Development of N(2) sensor for determination of PN(2) in body tissues
[AD-A171330] N87-15690
EIDGENOESSISCHE TECHNISCHE HOCHSCHULE, ZURICH (SWITZERLAND).
Parameterization of glacierization for a climate model N87-15560
ENVIRONMENTAL ANALYSIS AND REMOTE SENSING, DELFT (NETHERLANDS).
Group Agromet Monitoring Project (GAMP) methodology integrated mapping of rainfall, evapotranspiration, germination, biomass development and thermal inertia, based on Meteosat and conventional meteorological data N87-15626
ERIVAN STATE UNIV. (USSR).
Output energy in pulsars N87-15853
ESPRIT TECHNOLOGY, INC., WALNUT CREEK, CALIF.
Small, self-contained aircraft fatigue data recorder
[AD-A172400] N87-15207
ESSEN UNIV. (WEST GERMANY).
Space applications of basic plasma theory N87-15248
EUROPEAN CENTRE FOR MEDIUM-RANGE WEATHER FORECASTS, READING (ENGLAND).
Treatment of land-surface properties in the ECMWF model N87-15552
EUROPEAN SPACE AGENCY, PARIS (FRANCE).
Boundary layer control by transition fixing
[ESA-TT-909] N87-15160
Proceedings of an ESA Workshop on Land Mobile Services by Satellite
[ESA-SP-259] N87-15361
Proceedings of an International Satellite Land-Surface Climatology Project (ISLSCP) Conference
[ESA-SP-248] N87-15544
Proceedings of the Joint Varenna-Abastumani International School and Workshop on Plasma Astrophysics
[ESA-SP-251] N87-15793
EUROPEAN SPACE AGENCY. EUROPEAN SPACE RESEARCH AND TECHNOLOGY CENTER, ESTEC, NOORDWIJK (NETHERLANDS).
PRODAT system architecture N87-15371
Advanced regional mobile satellite system for the nineties N87-15375
L-band antennas for regional mobile communication satellites N87-15377
A land mobile satellite for digital communications in Europe N87-15388
EWBANK PREECE CONSULTING LTD., BRIGHTON (ENGLAND).
Frequency allocation in the land mobile satellite service N87-15383

F

FABRICA ITALIANA APPARECCHI RADIO S.P.A., MILAN.
Implementation of a land .nobile terminal for satellite data communication N87-15374
Robot system for dexterous tasks (for space applications)
[ETN-86-98562] N87-15472
FEDERAL AVIATION ADMINISTRATION, WASHINGTON, D.C.
Task force on emergency evacuation of transport airplanes. Volume 2: Supporting documentation
[AD-A172256] N87-15194
Air traffic control radar beacon system transponder performance study and analysis. Vol. 1: Transponder test methodology results, analysis and recommendations
[DOT/FAA/FS-86/1.1-VOL-1] N87-15198

Inhalation toxicology. Part 7: Times to incapacitation and death for rats exposed continuously to atmospheric acrolein vapor
[AD-A169666] N87-15680

FLORIDA INST. OF TECH., MELBOURNE.
The detailed mathematical prediction of simultaneous heat and mass transfer in cavities N87-15440

FLORIDA STATE UNIV., TALLAHASSEE.
African drought: An example of the influence of land-surface properties on climate N87-15602
Large deviation local limit theorems for random vectors
[AD-A171178] N87-15748
The facilitation of direct searching of online services by the end user in academic libraries N87-15899

FLORIDA UNIV., GAINESVILLE.
Adaptive control of robotic manipulators N87-15700

FLOW ANALYSIS, INC., TULLAHOMA, TENN.
Grid generation for turbomachinery problems
[NASA-CR-178968] N87-15745

FORD AEROSPACE AND COMMUNICATIONS CORP., PALO ALTO, CALIF.
Space station experiment definition: Advanced power system test bed
[NASA-CR-179502] N87-15270

FORD MOTOR CO., DEARBORN, MICH.
OH detection by Ford Motor Company N87-15634

FRAUNHOFER INST. FUER WERKSTOFFMECHANIK, FREIBURG (WEST GERMANY).
Experimental investigations with notched samples of elastic-plastic materials behavior
[W-2/84] N87-15496

FREIE UNIV., BERLIN (WEST GERMANY).
Surface temperature from AVHRR and TOVS from the meteorological satellite NOAA 9 N87-15574
Satellite-derived vegetation index over Europe N87-15583

FREQUENCY ELECTRONICS, INC., MITCHEL AFB, N.Y.
High performance crystal oscillator development
[AD-A172631] N87-15433

G

GENERAL ACCOUNTING OFFICE, WASHINGTON, D. C.
Air traffic control: FAA's (Federal Aviation Administration's) advanced automation system acquisition strategy is risky
[PB86-231743] N87-15200

GENESIS SCIENTIFIC ENTERPRISES, ARCHER, FLA.
Appropriate technology small grants program
[DE86-015463] N87-15523

GEORGIA INST. OF TECH., ATLANTA.
Wind tunnel data from a rotor wake/airframe interaction study
[AD-A171333] N87-15180
High temperature monotonic and cyclic deformation in a directionally solidified nickel-base superalloy
[NASA-CR-175101] N87-15303
Two-photon laser-induced fluorescence detection of OH N87-15633

GEORGIA STATE UNIV., ATLANTA.
Investigations of the interactions of radiation with matter
[AD-A171232] N87-15779

GHENT UNIV. (BELGIUM).
Assessment of wind and fluvial action by using LANDSAT-MSS color composites in the lower Nile Valley (Egypt) N87-15612

GKSS-FORSCHUNGSZENTRUM GEESTHACHT (WEST GERMANY).
Influence of multiple cloud layers on planetary albedo N87-15635
Multiangle or multiwavelength technique for remote sensing of sea surface temperature N87-15652

GOODYEAR AEROSPACE CORP., LITCHFIELD PARK, ARIZ.
Interleaved arrays antenna technology development
[NASA-CR-171951] N87-15393

GRUMMAN AEROSPACE CORP., BETHPAGE, N.Y.
Canard/Tail transonic analysis
[AD-A171075] N87-15189

H

HAMBURG UNIV. (WEST GERMANY).
Radiation budget variations caused by thin cirrus N87-15636

HAMPTON INST., VA.
Intense excitation source of blue-green laser
[AD-A172660] N87-15460

HUGHES AIRCRAFT CO., ENGLEWOOD, COLO.
Development of Ku-band rendezvous radar tracking and acquisition simulation programs
[NASA-CR-171950] N87-15392

HYPRESS, INC., ELMSFORD, N.Y.
Development of NbN Josephson Junction technology
[AD-A171087] N87-15885

I

IDAHO NATIONAL ENGINEERING LAB., IDAHO FALLS.
Ultrasonic backscatter and attenuation measurements for microstructure characterization: Application to consolidated rapidly solidified type 304 stainless steel powder
[DE86-014917] N87-15300

ILLINOIS UNIV., URBANA.
Delay modeling of bipolar ECL/EFL (Emitter-Coupled Logic/Emitter-Follower-Logic) circuits
[AD-A171131] N87-15424

IMAP, PARIS (FRANCE).
Hydrological Atmospheric Pilot Experiment (HAPEX) hydrology budget modeling (MOBILHY): Outline of the program N87-15632

INDIAN INST. OF GEOMAGNETISM, BOMBAY.
Spontaneous reconnection in the Earth's magnetotail N87-15625

INDIAN INST. OF SCIENCE, BANGALORE.
Some interesting features in the drift pair phenomena of solar decametric radiation N87-15613

INDIAN SPACE RESEARCH ORGANIZATION, AHMEDABAD.
Indian remote sensing program N87-15242
Satellite communications N87-15251
Variation of skin temperature in desert regions in the neighbourhood of India in relation to Asian monsoon circulation N87-15620
AVHRR and MSS data based vegetation indices studies over Indian sites N87-15622

INDIAN SPACE RESEARCH ORGANIZATION, BANGALORE.
Status of launch vehicle, satellite and mission related activities for MEOSS N87-15244

INDIAN SPACE RESEARCH ORGANIZATION, SRIHARIKOTA.
ISRO telemetry, tracking and command network (ISTRA) N87-15249

INDIAN SPACE RESEARCH ORGANIZATION, TRIVANDRUM.
Possible areas of collaboration between DFVLR and ISRO in the fields of structures and materials N87-15252

INDIANA UNIV., BLOOMINGTON.
Study of transient phonon dynamics
[AD-A172691] N87-15692

INGENIEURBUERO SCHROEDER G.M.B.H., HOEHR-GRENZHAUSEN (WEST GERMANY).
Development of cooling materials and feeding processes for energy-optimized baking of carbon products
[BMFT-FB-T-86-001] N87-15315

INNSBRUCK UNIV. (AUSTRIA).
Vegetation identification and variability in the Tahoua area, Nigeria N87-15610

INSTITUT ATOMNOI ENERGII, MOSCOW (USSR).
Vortex and spiral structures in sheared flows N87-15666

INSTITUT FRANCAIS DU PETROLE, VERNAISON.
Multiphase problems related to safety studies in the process industries N87-15324

INSTITUT FUER ANGEWANDTE GEODAESIE, FRANKFURT AM MAIN (WEST GERMANY).
Contributions to geodesy, photogrammetry, and cartography, series 2, no. 44
[ISSN-0469-4244] N87-15498
Computer-assisted construction of a structural atlas of Switzerland N87-15499
Inertial surveying and the collection of data base information N87-15500
Transformation of the logic of a thematic map construction model to a user interface in automated cartography N87-15501
The differing requirements of producers and users of data and the design of topographic/cartographic databases N87-15502
Mass digitization: The old way. Experiences with a manual digitizing system N87-15503
Computer-aided production of thematic maps for traffic data N87-15504
Planning and control of map production and reproduction using computers N87-15505
Problems of digital automated mapping N87-15506
Mapping of agricultural lands in the USSR N87-15507
Automatic geometric correction after scanning N87-15508
Data gathering: Cost/time considerations N87-15509
The creation of an environmental information system for the European Community N87-15510
Map data requirement for civil land vehicle navigation and location synopsis N87-15511
A digital raster procedure for updating a topographic map N87-15512
Problems in establishing and updating a digital cartographic data base at the millionth scale N87-15513

INSTITUT NATIONAL DE LA RECHERCHE AGRONOMIQUE, AVIGNON (FRANCE).
Estimation of regional evaporation using midday surface temperature from satellite thermal IR data N87-15591

INSTITUT NATIONAL DE RECHERCHE D'INFORMATIQUE ET D'AUTOMATIQUE, ROCQUENCOURT (FRANCE).
The virtual tree processor. Deliverable D2.A2 of task T2 N87-15715

INSTITUT NATIONAL DE RECHERCHE D'INFORMATIQUE ET D'AUTOMATIQUE, VALBONNE (FRANCE).
Interfaces between LISP and A Screen Handler (ASH). Deliverable D2.A2 of task T2 N87-15714

INSTITUTE OF GAS TECHNOLOGY, CHICAGO, ILL.
High-temperature composite thermal energy storage for solar applications
[DE86-014161] N87-15522

INSTITUTE OF NUCLEAR PHYSICS, NOVOSIBIRSK (USSR).
Generation of plasma flows by oscillations of magnetic flux tubes N87-15603
Magnetic energy dissipation in a rarefied plasma by the relaxation process N87-15624

INSTITUTO DE ELECTRONICA DE COMUNICACIONES, MADRID (SPAIN).
Low gain antennas for land-mobile terminals N87-15373

INSTITUTO DE PESQUISAS ESPACIAIS, SAO JOSE DOS CAMPOS (BRAZIL).
The use of aerial remote sensing in a case study of desertification: Quixaba-PE
[INPE-3963-PRE/980] N87-15519

INSTITUUT VOOR CULTUURTECHNIEK EN WATERHUISHOUDING, WAGENINGEN (NETHERLANDS).
Ground water-fed lakes in the Libyan desert: Their varying area as observed by means of LANDSAT-MSS data N87-15611
Future European plans in the framework of the International Satellite Land Surface Climatology Project (ISLSCP) N87-15626

INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS, TRIESTE (ITALY).
Spontaneous compactification of extra dimensions in eleven-dimensional quantum gravity
[DE86-702620] N87-15695
Effective Einsteinian gravity from Poincare gauge field theory
[DE86-702674] N87-15697

INTERNATIONAL MARITIME SATELLITE ORGANIZATION, LONDON (ENGLAND).
Economic and market aspects of land mobile satellite compared to terrestrial cellular radio N87-15365
The INMARSAT Standard-C service N87-15372
Spectrum requirements for the land mobile satellite service, INMARSAT N87-15382
Institutional aspects: INMARSAT N87-15384

IOWA UNIV., IOWA CITY.
Sporadic narrowband radio emissions from Uranus
[AD-A170947] N87-15626

ITALSPAZIO, ROME (ITALY).
Land mobile communications satellite N87-15363

J

JAPAN ATOMIC ENERGY RESEARCH INST., TOKYO.
Calculations of heat deposition in a target system bombarded by high energy charged particles
[DE86-700263] N87-15784

JAPAN METEOROLOGICAL AGENCY, TOKYO.
Land-surface parameterization in the Japan Meteorological Agency (JMA) operational spectral model N87-15551

JET PROPULSION LAB., CALIFORNIA INST. OF TECH., PASADENA.
The Telecommunications and Data Acquisition Report
[NASA-CR-179938] N87-15329
Reference frequency transmission over optical fiber N87-15330
Design considerations for the beam-waveguide retrofit of a ground antenna station N87-15331
A synchronization technique for optical PPM signals N87-15332
Received optical power calculations for optical communications link performance analysis N87-15333
A cooled avalanche photodiode with high photon detection probability N87-15334

Fraunhofer filters to reduce solar background for optical communications N87-15335
A cost-performance model for ground-based optical communications receiving telescopes N87-15336
Relative performance of 8.5-GHz and 32-GHz telemetry links on the basis of total data return per pass N87-15337
Long-term amplitude and phase stability of the 400-kW 2.115-GHz transmitter N87-15338
DSN microwave antenna holography. Part 2: Data processing and display of high-resolution effective maps N87-15339
A single VLSI chip for computing syndromes in the (225, 223) Reed-Solomon decoder N87-15340
Table look-up estimation of signal and noise parameters from quantized observables N87-15341
A comparison of methods for DPLL loop filter design N87-15342
A generalized algorithm to design finite field normal basis multipliers N87-15343
X-band uplink feedcone capabilities, components, and layout N87-15344
A new algorithm for microwave delay estimation from water vapor radiometer data N87-15345
Block 2A traveling-wave maser N87-15346
Antenna servo control system characterization: Rate loop analysis for 34-m antenna at DSS 15 N87-15347
Software development for the VLA-GDSCC telemetry array project N87-15348
Real-time combiner loss N87-15349
PPM/NAR 8.4-GHz noise temperature statistics for DSN 64-meter antennas, 1982-1984 N87-15350
Rivited panel surface measurement using photogrammetry N87-15351
Pointing calibration of the MKIVA DSN antennas Voyager 2 Uranus encounter operations support N87-15352
Giotto mission support N87-15353
Giotto navigation support N87-15354
Pathfinder operations N87-15355
VEGA Pathfinder navigation for Giotto Halley encounter N87-15356
Selection of radio sources for Venus balloon-Pathfinder Delta-DOR navigation at 1.7 GHz N87-15357
ICE Second Halley radial: TDA mission support and DSN operations N87-15358
Propagation through Martian dust at 8.5 and 32 GHz N87-15359
Systolic VLSI for Kalman filters N87-15360
Remote detection of OH N87-15536
Observations of the seasonal variability of soil moisture and vegetation cover over Africa using satellite microwave radiometry N87-15593

JOHANN-WOLFGANG-GOETHE-UNIV., FRANKFURT AM MAIN (WEST GERMANY).
Effect of measured aerosol absorption on the radiation budget N87-15646

JOHNS HOPKINS UNIV., BALTIMORE, MD.
Bedrest in healthy women: Effects of menstrual function and oral contraceptives
[NASA-CR-171946] N87-15681

K

KANSAS UNIV. CENTER FOR RESEARCH, INC., LAWRENCE.
TRANDESNF: A computer program for transonic airfoil design and analysis in nonuniform flow
[NASA-CR-4044] N87-15186

KASETSART UNIV., BANGKOK (THAILAND).
The application of LANDSAT imagery for land cover assessment N87-15614

KENTUCKY UNIV., LEXINGTON.
Signal processing in ultrasonic NDE (nondestructive evaluation)
[AD-A172687] N87-15475

KENYA METEOROLOGICAL DEPT., NAIROBI.
Use of remote sensing application for agricultural expansion into semi-arid areas of Kenya N87-15607

KERNFORSCHUNGSANLAGE, JUELICH (WEST GERMANY).
OH radical measurements by optical absorption spectroscopy N87-15530

KERNFORSCHUNGSZENTRUM, KARLSRUHE (WEST GERMANY).
The correlation between the physico-chemical and optical properties of tropospheric aerosols with regard to the radiation budget (POETA) program N87-15647

KEURING VAN ELECTROTECHNISCHE MATERIALEN N.V., ARNHEM (NETHERLANDS).
Short term creep tests N87-15487

KHARKOV STATE UNIV. (USSR).
Energy dissipation and convective motors in the local MHD-resonance regions in solar chromosphere N87-15806

KHARTOUM UNIV. (SUDAN).
Toward a drought-oriented climatic prediction system in Western Sudan N87-15606

KIEL UNIV. (WEST GERMANY).
Cloud detection and classification over oceans at night with NOAA-7 N87-15651

KONINKLIJKE MILITAIRE ACADEMIE (NETHERLANDS).
Nondestructive methods for the inspection of creep-loaded installations N87-15486

L

LAGOS UNIV. (NIGERIA).
The Sahel droughts: 1941-1984 N87-15603

LAWRENCE LIVERMORE NATIONAL LAB., CALIF.
New approach for calibration and interpretation of IRAD GAGE vibrating-wire stressmeters
[DE86-010975] N87-15455

LEHIGH UNIV., BETHLEHEM, PA.
Corrosion fatigue and electrochemical reactions in modified HY130 steel
[AD-A172242] N87-15296
Electrochemical reactions with bare metal surfaces and corrosion fatigue crack growth
[AD-A172248] N87-15297

LEIDEN UNIV. (NETHERLANDS).
Radiative acceleration of clouds near compact accreting objects N87-15843

LENINGRAD (A. A. ZHDANOV) STATE UNIV. (USSR).
Ion acceleration in solar flares enriched by helium-3 and in gamma-ray line flares N87-15808

LIGHTNING AND TRANSIENTS RESEARCH INST., ST. PAUL, MINN.
An experimental and theoretical study of nuclear-EMP (electromagnetic pulse)-type lightning simulators with combined peaking capacitor and crowbar
[AD-A172648] N87-15407

LINCOM CORP., LOS ANGELES, CALIF.
Space Shuttle/TDRSS communication and tracking systems analysis
[NASA-CR-171948] N87-15391

LIVERPOOL UNIV. (ENGLAND).
Observations of hierarchal grain boundary dislocation structures in 001 symmetric tilt boundaries in gold
[DE86-015729] N87-15301
Zero-D sensitivity studies with the NCAR CCM land surface parameterization scheme N87-15562

LUDWIG-MAXIMILIANS-UNIVERSITAET, MUNICH (WEST GERMANY).
Satellite Measurements of Radiation Budget of the Earth (3rd Symposium)
[BMFT-FB-W-86-011] N87-15630
Uncertainty of satellite derived clear sky shortwave radiation budget N87-15644
Determination of the longwave surface net flux from radiances to space N87-15648
Problems in the application of thermal images in urban climatology N87-15649
Measurements and estimations of the energy balance and surface temperature of the Dischma Valley (Switzerland) N87-15650

LUND UNIV. (SWEDEN).
Desertification monitoring: Remotely sensed data for drought impact studies in the Sudan N87-15604
Surface albedo change in arid regions in the Sudan N87-15615

M

MANAGEMENT AND TECHNICAL SERVICES CO., WASHINGTON, D.C.
USSR Space Life Sciences Digest, issue 9
[NASA-CR-3922(10)] N87-15679

MARMARA RESEARCH INST., GEBZE (TURKEY).
Remote sensing activites in Turkey: Possible contributions to climate studies N87-15624

MARTIN MARIETTA AEROSPACE, DENVER, COLO.
Dynamic testing of a two-dimensional box truss beam
[NASA-CR-4039] N87-15262

MARYLAND UNIV., COLLEGE PARK.
Dynamic stability of hingeless and bearingless rotor blades in forward flight N87-15201

MASCHINENFABRIK AUGSBURG-NUERNBERG A.G., MUNICH (WEST GERMANY).
Communication by satellites for truck systems N87-15366

MASSACHUSETTS INST. OF TECH., CAMBRIDGE.
Observations of hierarchal grain boundary dislocation structures in 001 symmetric tilt boundaries in gold
[DE86-015729] N87-15301
Report of a discussion meeting on the structure of internal interfaces
[DE86-015730] N87-15302
Mechanical properties versus morphology of ordered polymers, volume 6
[AD-A171221] N87-15307
Dielectric analysis of the cure of thermosetting epoxy/amine systems
[AD-A171274] N87-15308
Condensation polymers with controlled structure
[AD-A172283] N87-15311
Aging of polyurethane foams, the influence of gas diffusion on thermal conductivity
[DE86-014339] N87-15314
Methods of multiple access communications with energy detectors
[AD-A172757] N87-15409
Digital simulation of the measured electrochemical response of reversible redox couples at microelectrode arrays: Consequences arising from closely spaced ultramicroelectrodes
[AD-A171181] N87-15425
Digital simulation of the measured electrochemical response of reversible redox couples at microelectrode arrays: Consequences arising from closely spaced ultramicroelectrodes
[AD-A171272] N87-15427
PH sensitive WO3-Based microelectrochemical transistors
[AD-A172563] N87-15432
Amplification of electrical signals with molecule-based transistors: Power amplification up to a kilohertz frequency and factors limiting higher frequency operation
[AD-A172709] N87-15434
Research on factors that affect the reliability of compressed gas insulated apparatus
[DE86-014417] N87-15437
Modification of microelectrode arrays: New microelectrochemical devices for sensor applications
[AD-A171180] N87-15454
Estimation of vegetation cover at subpixel resolution using LANDSAT data
[NASA-CR-177077] N87-15514
Crustal deformation in great California earthquake cycles
[NASA-CR-180059] N87-15655
Strain accumulation and surface deformation along the San Andreas, California
[NASA-CR-180058] N87-15657
Mechanics of shear rupture applied to earthquake zones
[NASA-CR-180070] N87-15663
Nonsequential computation and laws of nature
[AD-A171505] N87-15731
The power of the queue
[AD-A171536] N87-15732
Tight bounds for minimax grid matching, with applications to the average case analysis of algorithms
[AD-A171552] N87-15733
Randomized routing on fat trees
[AD-A171546] N87-15736
Distributed control in computer networks and cross-sections of colored multidimensional bodies
[AD-A172224] N87-15740
Vector image method for the derivation of elastostatic solutions for point sources in a plane layered medium. Part 1: Derivation and simple examples
[NASA-CR-180062] N87-15743
Image method for the derivation of point sources in elastostatic problems with plane interfaces
[NASA-CR-180060] N87-15744
Correctness conditions for highly available replicated databases
[AD-A171427] N87-15901

MATRA ESPACE, PARIS-VELIZY (FRANCE).
Data transmission: A key factor to the efficiency of the transport industry N87-15369

MAX-PLANCK-INST. FUER CHEMIE, MAINZ (WEST GERMANY).
OH measurement by laser light absorption N87-15531

MAX-PLANCK-INST. FUER METALLFORSCHUNG, STUTTGART (WEST GERMANY).
Report of a discussion meeting on the structure of internal interfaces
[DE86-015730] N87-15302

MAX-PLANCK-INST. FUER METEOROLOGIE, HAMBURG (WEST GERMANY).
A cloud climatology for the South Atlantic derived from Meteosat data N87-15633

MAX-PLANCK-INSTITUT FUER STROEMUNGSFORSCHUNG, GOETTINGEN (WEST GERMANY).
The five deepest potential hypersurfaces of the CH2(+) ion. Description by continuous functions adapted to initial values
[MPIS-4/1986] N87-15781

MCDONNELL-DOUGLAS HELICOPTER CO., MESA, ARIZ.
Application of higher harmonic blade feathering on the OH-6A helicopter for vibration reduction
[NASA-CR-4031] N87-15175
MESSERSCHMITT-BOELKOW-BLOHM G.M.B.H., BREMEN (WEST GERMANY).
Problems of the application of wind tunnel results to aerodynamic performance of large aircraft N87-15161
Boundary layer transition control for takeoff and landing configurations N87-15162
Transition fixing in the high speed range for the development of civil aircraft wings N87-15164
METAALINSTITUT TNO, APELDOORN (NETHERLANDS).
Replicas and structural analysis: Criteria for the reliability of creep-loaded installations N87-15484
Structure as a criterion for high temperature ductility N87-15485
Evaluation of the Dutch Welding Institute (residual) life project N87-15489
METAALINSTITUUT TNO, HENGELO (NETHERLANDS).
Experimental program N87-15482
METEOROLOGICAL OFFICE, BRACKNELL (ENGLAND).
Issues concerning the evaluation of effective surface roughness of heterogeneous terrain N87-15556
The sensitivity of the UK Meteorological Office atmospheric general circulation model to recent changes to the parameterization of hydrology N87-15564
Indications of the sensitivity of European climate to land use variations using a one-dimensional model N87-15566
On changes in soil moisture in CO2 climate studies N87-15568
Remote sensing identified in climate model experiments with hydrological and albedo changes in the Sahel N87-15569
METEOROLOGICAL RESEARCH INST., YATABE (JAPAN).
The sensitivity experiment to land-surface boundary conditions with the Meteorological Research Institute General Circulation Model (MRI GCM) N87-15565
MIDWEST RESEARCH INST., GOLDEN, COLO.
Current- and lattice-matched tandem solar cell
[DE86-013757] N87-15521
Measuring and modeling solar irradiance on vertical surfaces
[DE86-010737] N87-15668
MILAN UNIV. (ITALY).
Blazars: Beamed or not beamed N87-15801
Pairs of pulsars in the diagram P dot versus P N87-15856
MINISTERIE VAN ONDERWIJS EN WETENSCHAPPEN, GRONINGEN (NETHERLANDS).
Assessment of creep loaded high temperature installations N87-15481
MINNESOTA UNIV., MINNEAPOLIS.
Topics in cosmology and particle physics
[DE86-014830] N87-15923
MISSION RESEARCH CORP., ALBUQUERQUE, N. MEX.
Control of ion-velocity distributions in laser-target interaction experiments
[AD-A172649] N87-15880
MITRE CORP., BEDFORD, MASS.
Predicting antenna sidelobe performance
[AD-A172708] N87-15408
MOBILE SATELLITE CORP., KING OF PRUSSIA, PA.
Mobile aviation services in the 1545-1559/1646.5-1660.5 MHz band N87-15364
The United States mobile satellite service N87-15381
MOREHOUSE COLL., ATLANTA, GA.
Ada applications to real-time computer systems
[AD-A169493] N87-15723
MOSCOW STATE UNIV. (USSR).
Correlative properties of self-exciting fluctuative magnetic fields N87-15874
MULLARD SPACE SCIENCE LAB., DORKING (ENGLAND).
The prospects for hydrological measurements using ERS-1 N87-15588

N

NAGOYA UNIV. (JAPAN).
Resonant ion acceleration by magnetosonic shock waves N87-15827
Very hot interstellar matter heated by a galactic shock wave N87-15826
NATIONAL ACADEMY OF PUBLIC ADMINISTRATION, WASHINGTON, D. C.
NASA: The vision and the reality
[OP-5] N87-15898
NATIONAL AERONAUTICAL ESTABLISHMENT, OTTAWA (ONTARIO).
Regional measurements of evapotranspiration using aircraft mounted sensors N87-15598
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D.C.
Procedure for computing transonic flows for control of adaptive wind tunnels
[NASA-TM-88530] N87-15235
Direct calculation of wall interferences and wall adaptation for two-dimensional flow in wind tunnels with closed walls
[NASA-TM-88523] N87-15236
Investigation of the components of the NAL high Reynolds number two-dimensional wind tunnel. Part 4: Design, construction and performance of the exhaust silencer
[NASA-TM-88513] N87-15237
Technology for large space systems: A bibliography with indexes (supplement 15)
[NASA-SP-7046(15)] N87-15239
X-ray satellite (ROSAT)
[NASA-TM-88499] N87-15261
An overview of CVD processes
[NASA-TM-88450] N87-15283
The barium iron ruthenium oxide system
[NASA-TM-88451] N87-15284
Automation of preparation of nonmetallic samples for analysis by atomic absorption and inductively coupled plasma spectrometry
[NASA-TM-88476] N87-15285
The use of electrical discharge for ignition and control of combustion of solid propellants
[NASA-TM-88548] N87-15317
Current status and expected developments in the area of satellite communications in the Latin American and Caribbean region
[NASA-TM-88000] N87-15395
Study of nickel hydroxide electrodes. 2: Oxidation products of nickel (2) hydroxides
[NASA-TM-88473] N87-15416
Conservative boundary conditions for 3D gas dynamics problems
[NASA-TM-88487] N87-15444
Control of H2S emissions using an ozone oxidation process: Preliminary results
[NASA-TM-88475] N87-15525
Cratering mechanics
[NASA-TM-88477] N87-15662
Reference Mission Operational Analysis Document (RMOAD) for the Life Sciences Research Facilities
[NASA-TM-89604] N87-15678
On the pilot's behavior of detecting a system parameter change
[NASA-TM-88479] N87-15695
Test processing system (SEE)
[NASA-TM-88514] N87-15704
Effect of sonic boom on avalanches. Preparation for flight of a supersonic jet over the Lavay Valley
[NASA-TM-88535] N87-15775
Astroblemes on trapp rock: Structural features and differences from impact structures on other targets
[NASA-TM-88484] N87-15921
Geological-morphological description of the Lakshmi planum (photomap of the Venusian surface sheet B-4)
[NASA-TM-88495] N87-15926
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. AMES RESEARCH CENTER, MOFFETT FIELD, CALIF.
A comparison of the acoustic and aerodynamic measurements of a model rotor tested in two anechoic wind tunnels
[NASA-TM-88364] N87-15178
Unsteady aerodynamic load estimates on turning vanes in the national full-scale aerodynamic complex
[NASA-TM-88191] N87-15179
AGARD Fluid Dynamics Panel Symposium on Applications of Computational Fluid Dynamics in Aeronautics: Proceedings
[NASA-TM-88356] N87-15181
Aerodynamic characteristics of two-dimensional wing configurations at angles of attack near -90 deg
[NASA-TM-88373] N87-15182
Preliminary study of a wing-tip vortex using laser velocimetry
[NASA-TM-88343] N87-15185
Weightlessness simulation system and process
[NASA-CASE-ARC-11646-1] N87-15253
Preparation of B-Trichloroborazine
[NASA-CASE-ARC-11643-1-SB] N87-15275
Process for curing bismaleimide resins
[NASA-CASE-ARC-11429-4] N87-15304
Vortical dissipation in two-dimensional shear flows
[NASA-TM-89408] N87-15445
Indirect determination of OH N87-15537
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. GODDARD INST. FOR SPACE STUDIES, NEW YORK, N.Y.
Data needs and data bases for climate studies N87-15571
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. GODDARD SPACE FLIGHT CENTER, GREENBELT, MD.
Parameterization of albedo, thermal inertia, and surface roughness of desert scrub/sandy soil surface N87-15557
A brief description of the simple biosphere model (SiB) N87-15558
Remote sensing of land-surface temperature from HIRS/MSU data N87-15573
The first International Satellite Land Surface Climatology Project (ISLSCP) Field Experiment - FIFE N87-15629
Lageos orbit decay due to infrared radiation from Earth
[NASA-TM-87804] N87-15665
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LYNDON B. JOHNSON SPACE CENTER, HOUSTON, TEX.
Mobile remote manipulator system for a tetrahedral truss
[NASA-CASE-MSC-20985-1] N87-15260
Infusion extractor
[NASA-CASE-MSC-20761-1] N87-15465
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LANGLEY RESEARCH CENTER, HAMPTON, VA.
Applicability of linearized-theory attached-flow methods to design and analysis of flap systems at low speeds for thin swept wings with sharp leading edges
[NASA-TP-2653] N87-15174
An efficient algorithm for solution of the unsteady transonic small-disturbance equation
[NASA-TM-89014] N87-15176
LaRC conceptual design of solid rocket booster in-line bolted joint
[NASA-TM-89046] N87-15177
Efficient solutions to the Euler equations for supersonic flow with embedded subsonic regions
[NASA-TP-2523] N87-15183
Subsonic maneuver capability of a supersonic cruise fighter wing concept
[NASA-TP-2642] N87-15184
Interdisciplinary and multilevel optimum design
[NASA-TM-89077] N87-15205
Space spider crane
[NASA-CASE-LAR-13411-1] N87-15259
Comparison of flexural properties of aramid-reinforced pultrusions having varied matrices, pretreatments and postcures
[NASA-TM-88997] N87-15277
Composite piston
[NASA-CASE-LAR-13435-1] N87-15464
Field test to intercompare carbon monoxide, nitric oxide and hydroxyl instrumentation at Wallops Island, Virginia
[NASA-TM-87718] N87-15524
Future directions for H sub x O sub y detection
[NASA-CP-2448] N87-15528
Future directions for H sub x O sub y detection, executive summary N87-15529
User's guide to programming fault injection and data acquisition in the SIFT environment
[NASA-TM-87638] N87-15722
An assessment of transport coefficient approximations used in galactic heavy ion shielding calculations
[NASA-TM-89054] N87-15782
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LEWIS RESEARCH CENTER, CLEVELAND, OHIO.
Viscous analyses for flow through subsonic and supersonic intakes
[NASA-TM-88831] N87-15173
Electrical power system design for the US space station
[NASA-TM-88824] N87-15267
Adhesion, friction, and deformation of ion-beam-deposited boron nitride films
[NASA-TM-88902] N87-15305
Two- and three-dimensional viscous computations of a hypersonic inlet flow
[NASA-TM-88923] N87-15441
Evaluation of seals for high-performance cryogenic turbomachines
[NASA-TM-88919] N87-15442
Gas particle radiator
[NASA-CASE-LEW-14297-1] N87-15452
New generation methods for spur, helical, and spiral-bevel gears
[NASA-TM-88862] N87-15466
Lubricant effects on bearing life
[NASA-TM-88875] N87-15467

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. MARSHALL SPACE FLIGHT CENTER, HUNTSVILLE, ALA.
Low-speed aerodynamic characteristics of a wing-canard configuration with underwing spanwise blowing on the trailing-edge flap system
[NASA-TM-89020] N87-15180
Self-clamping arc light reflector for welding torch
[NASA-CASE-MFS-29207-1] N87-15786
Experimental evaluation of the ring focus test for X-ray telescopes using AXAF's technology mirror assembly, MSFC CDDF Project No. H20
[NASA-TM-86570] N87-15916

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. PASADENA OFFICE, CALIF.
High intensity casting system
[NASA-CASE-NPO-16901-1-CU] N87-15327
Ground plane interference elimination by passive element
[NASA-CASE-NPO-16632-1-CU] N87-15390
Large TV display system
[NASA-CASE-NPO-16932-1] N87-15413
Coaxial cable connector
[NASA-CASE-NPO-16764-1] N87-15414
Method for growing low defect, high purity crystalline layers utilizing lateral overgrowth of a patterned mask
[NASA-CASE-NPO-15813-2] N87-15682
Tailorable infrared sensing device with strain layer superlattice structure
[NASA-CASE-NPO-16607-1] N87-15883

NATIONAL AEROSPACE LAB., AMSTERDAM (NETHERLANDS).
Experiences with transition fixing in the high speed regime at NLR, Netherlands N87-15163
Fracture mechanics and creep crack growth in steel of the type 1%Cr0.5Mo, with or without preceeding exposure under creep crack circumstances N87-15488

NATIONAL AEROSPACE LAB., EMMELOORD (NETHERLANDS).
Transition detection using surface pressure holes N87-15170

NATIONAL AEROSPACE LAB., TOKYO (JAPAN).
Experimental and theoretical approaches used at the National Aerospace Laboratory in Japan N87-15217
The National Gas Turbine projects in Japan. The FJR-710 turbofan engine project. The ADTJ-100 high efficient gas turbine project N87-15218

NATIONAL BUREAU OF STANDARDS, GAITHERSBURG, MD.
Ultrasonic measurements research: Improved acoustic emission methods
[AD-A172726] N87-15778

NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C.
Research for electric energy systems
[DE86-012716] N87-15435

NATIONAL CENTER FOR ATMOSPHERIC RESEARCH, BOULDER, COLO.
Fluorometric method for the determination of gas-phase hydrogen peroxide N87-15541
GCM sensitivity studies: Implications for parameterizations of land processes N87-15561
Downward longwave radiation at the surface in clear-sky atmospheres: Comparisons of measured, satellite-derived, and calculated fluxes N87-15578

NATIONAL INTERAGENCY COORDINATION GROUP.
International Aerospace and Ground Conference on Lightning and Static Electricity. Technical papers: The key to lightning technology, held in Orlando, Florida on 26-28 June 1984
[AD-A169867] N87-15192

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, BOULDER, COLO.
Investigation of millimeter wave propagation in the atmosphere
[AD-A171526] N87-15404

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, SILVER SPRING, MD.
Water vapor profiles for Washington, D.C.; Boulder, Colorado; Palestine, Texas; Laramie, Wyoming and Fairbanks, Alaska during the period 1974 to 1985: Data report
[PB86-234622] N87-15675

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, WASHINGTON, D. C.
Surface radiation budget for climate applications N87-15575

NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION, BOULDER, COLO.
Model of a shaped-beam emission pattern of a satellite antenna for interference analysis
[PB86-238755] N87-15410

NATIONAL TRANSPORTATION SAFETY BOARD, WASHINGTON, D. C.
Aircraft accident reports: Brief format, US civil and foreign aviation, issue number 7 of 1985 accidents
[PB86-916921] N87-15195
Aircraft accident reports: Brief format, US civil and foreign aviation, issue number 6 of 1985 accidents
[PB86-916920] N87-15196

NAVAL AEROSPACE MEDICAL RESEARCH LAB., PENSACOLA, FLA.
Noise susceptibility: A comparison of two Naval aviator populations
[AD-A172222] N87-15693

NAVAL AIR DEVELOPMENT CENTER, WARMINSTER, PA.
Metallurgical variables influencing the corrosion susceptibility of P/M (Powder Metallurgy) 7091 Aluminum/SiCw composite
[AD-A170946] N87-15294

NAVAL OCEAN SYSTEMS CENTER, SAN DIEGO, CALIF.
Radiation resistance of thin antennas of arbitrary elevation and configuration over perfectly conducting ground
[AD-A170945] N87-15397
Effects of extended camera baseline and image magnification on target detection time and target recognition with a stereoscopic TV system
[AD-A171063] N87-15398
Longwave propagation: A brief review
[AD-A171147] N87-15400
Stationary/slowly moving target detection in strong background clutter
[AD-A172225] N87-15406
Induced insulator voltage in transmitter antenna guy cables
[AD-A169656] N87-15417

NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIF.
An experimental investigation of combustion modulation techniques for a solid fuel ramjet
[AD-A172322] N87-15230
Radiation produced by the modulated electron beam of a free electron laser
[AD-A171168] N87-15457
Design of a graphics user interface for a database management system
[AD-A171393] N87-15730
Adaptive modeling of the dynamics of autonomous land vehicles
[AD-A172404] N87-15911

NAVAL RESEARCH LAB., WASHINGTON, D. C.
Numerical simulations of the flowfield in a central-dump ramjet combustor. Part 1: Test of the model and effects of forcing
[AD-A170936] N87-15229
Degradation in performance of adaptive null-steering antennas
[AD-A169663] N87-15396
Linear and nonlinear theory of the Doppler-shifted cyclotron resonance maser based on TE and TM waveguide modes
[AD-A172231] N87-15459
Stress in a bonded wafer
[AD-A171056] N87-15493
Tethered balloon measurements at San Nicolas Island (October 1984): Instrumentation, data summary, preliminary data interpretation
[AD-A172226] N87-15674
An investigation of expert systems usage for software requirements development in the strategic defense initiative environment
[AD-A169659] N87-15724
Emissivity as a function of surface roughness: A computer model
[AD-A172230] N87-15790
Intense and short pulse electric field (dc and microwave) air breakdown parameters
[AD-A172227] N87-15878
X-ray spectroscopy with Z-pinch neon plasmas
[AD-A172228] N87-15879

NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER, ANNAPOLIS, MD.
Theoretical and experimental analysis of multidirectionally-braided composites
[AD-A172694] N87-15281

NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER, BETHESDA, MD.
An experimental investigation of wall pressure fluctuations beneath non-equilibrium turbulent flows
[AD-A171508] N87-15449

NAVAL SURFACE WEAPONS CENTER, SILVER SPRING, MD.
Research program on a compact and high-power microwave tube
[AD-A171567] N87-15430

NAVAL UNDERWATER SYSTEMS CENTER, NEW LONDON, CONN.
Signal-to-noise ratio requirements for detection of multiple pulses subject to partially correlated fading with chi-squared statistics of various degrees of freedom
[AD-A172223] N87-15405

NEBRASKA UNIV., LINCOLN.
Depolarization and scattering of electromagnetic waves
[AD-A171217] N87-15401
Comparison of measured and modeled radiation, heat and water vapor fluxes: FIFE pilot study
[NASA-CR-179989] N87-15516

NEDERLANDS INST. VOOR LASTECHNIEK, 'S-GRAVENHAGE.
Residual life. Information Day of the Dutch Institute of Welding Techniques
[ETN-87-98730] N87-15479
Introduction to the Dutch Welding Institute project (residual) life N87-15480

NETHERLANDS ENERGY RESEARCH FOUNDATION, PETTEN.
Analyses of stresses and strains N87-15483

NETHERLANDS INST. OF TRANSPORT, RIJSWIJK.
Economic aspects of communication in road transport N87-15368

NEW MEXICO STATE UNIV., LAS CRUCES.
Seeing effects and their calibration for astronomical speckle interferometry N87-15914

NEW MEXICO UNIV., ALBUQUERQUE.
Transactions of the symposia on space nuclear power systems: Summaries
[DE86-005725] N87-15785

NEW YORK UNIV., NEW YORK.
The perception of the higher derivatives of visual motion
[AD-A171076] N87-15687

NEW YORK UNIV. MEDICAL CENTER.
Intracortical interactions in visual processing
[AD-A169674] N87-15684

NEW ZEALAND METEOROLOGICAL SERVICE, WELLINGTON.
Calibration of normalized vegetation index against pasture growth N87-15585

NIAMEY UNIV. (NIGER).
Ground based atmospheric extinction measurement in the Sahel N87-15597

NICE UNIV. (FRANCE).
Time dependent behavior of interstellar maser features due to stimulated scattering through dense plasma clouds N87-15838

NOBEYEMA SOLAR RADIO OBSERVATORY (JAPAN).
Relativistic plasmas in active galactic nuclei N87-15794
Monte Carlo simulation of particle acceleration by shock waves N87-15830

NORTH CAROLINA UNIV., CHAPEL HILL.
Biochemical changes in bone in a model of weightlessness
[NASA-CR-180095] N87-15683
Synthesis and characterization of new low-dimensional metal complex conductors
[AD-A172659] N87-15891
Main sequence photometry of globular clusters N87-15920

NUCLEAR REGULATORY COMMISSION, WASHINGTON, D. C.
Program to analyze the failure mode of lead-acid batteries
[NUREG-CR-4833] N87-15415

O

OAK RIDGE NATIONAL LAB., TENN.
Tensile behavior of helium-implanted and neutron-irradiated V-15Cr-5Ti
[DE86-007301] N87-15292
Quality assurance methods manual for experimental design and data management
[DE86-015180] N87-15473

OBSERVATOIRE DU PIC-DU-MIDI, BAGNERES DE BIGORRE (FRANCE).
Earth rotation polar motion and climatology N87-15601

OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES, PARIS (FRANCE).
Transition fixing on wings in industrial wind tunnels and associated problems N87-15165

OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES, TOULOUSE (FRANCE).
Investigation of the conditions for tripping transition with roughness elements and their influence on boundary layer development N87-15168

OGDEN AIR LOGISTICS CENTER, HILL AFB, UTAH.
Surveillance report. Stage 1: Dissected Motor/Propellant Motor Number 0012029
[AD-A171132] N87-15274
OHIO STATE UNIV., COLUMBUS.
Formulation and minimality of nonlinear discrete time control systems N87-15233
Perturbation solutions of the equations of motion for a class of dual-spin spacecraft N87-15256
A spectral analysis of RV Tauri variables N87-15912
OKLAHOMA UNIV., NORMAN.
Infrared and CCD photometric study of spiral galaxies N87-15913
OLD DOMINION UNIV., NORFOLK, VA.
A simplified fourwall interference assessment procedure for airfoil data obtained in the Langley 0.3-meter transonic cryogenic tunnel
[NASA-CR-4042] N87-15187
OREGON STATE UNIV., CORVALLIS.
A boundary layer and soil moisture for use in GCMs N87-15555
ORTEL CORP., ALHAMBRA, CALIF.
Self-induced frequency scanning and distributed bragg reflection in semiconductor lasers with phase-conjugate feedback
[AD-A172933] N87-15461
OSAKA UNIV. (JAPAN).
Technology Reports of the Osaka University, volume 36, nos. 1844-1864
[ISSN-0030-6177] N87-15754
Statistical mechanics of one-dimensional systems. 4: Generalization of the hard-core repulsion in multicomponent gases N87-15755
Iterative methods and preconditioning for solving large system of linear equations N87-15756
Application of Barlow-Wu systems to safety monitoring systems N87-15757
On cavitation and residual creep life N87-15758
Real time optimization of thin plate TIG arc welding N87-15759
Improvement of image quality of radiograph by means of narrow area radiation method N87-15760
An analysis method of strongly connected structure based on fundamental cycles N87-15761
Application of superconducting magnet energy storage to power system stabilizing control N87-15762
Effect of light-soaking on electronic properties of glow-discharged hydrogenated amorphous silicon N87-15763
Electrical conductivity and carrier mobility in polyphenylacetylene and polychlorophenylacetylene and their doping effect N87-15764
Photoinduced effects in polythiophene film N87-15765
Transmission electron microscope and photoluminescence studies of ZnS crystalline films grown by low-pressure MOCVD N87-15766
Harmonic conversion of GEKKO 12 high-power Nd:glass laser N87-15767
Copper vapor lasers for isotope separation N87-15768
Development of a single-mode dye laser pumped by a copper vapor laser N87-15769
Non-reference analysis of rotational accuracy with nanometer resolution on ultraprecision spindle N87-15770
Natural convection of stably stratified fluid layer with uniform heating from below N87-15771
Effects of phosphoric acid on the lead-acid battery reactions N87-15772
OSLO UNIV. (NORWAY).
Basic theory of diameter control in Czochralski growth using the melt-weighing technique
[DE86-752529] N87-15884
OSNABRUECK UNIV. (WEST GERMANY).
Evaluation of climate relevant land surface characteristics from remote sensing N87-15572
OXFORD UNIV. (ENGLAND).
Unsteady aerodynamic and heat transfer processes in a transonic turbine stage N87-15220
The effect of wake passing on turbine blades N87-15221
The scaling of film cooling: Theoretical and experimental results N87-15222
Report of a discussion meeting on the structure of internal interfaces
[DE86-015730] N87-15302

P

PARIS-SUD UNIV., ORSAY (FRANCE).
Importance of the tropical rain forest as an atmospheric moisture source N87-15608
PENNSYLVANIA STATE UNIV., STATE COLLEGE.
Effects of strong diffraction on the focusing and scattering of acoustic waves
[AD-A171220] N87-15776
PENNSYLVANIA STATE UNIV., UNIVERSITY PARK.
Ferroic shape memory materials and Piezo:Pyro-Electric oriented recrystallized glasses
[AD-A171409] N87-15309
Utilization of satellite data in mesoscale modeling of severe weather
[NASA-CR-179917] N87-15669
Verification of mesoscale objective analyses of VAS and rawinsonde data using the March 1982 AVE/VAS special network data
[NASA-CR-179988] N87-15670
Utilization of VAS satellite data in the initialization of an oceanic-cyclogenesis simulation
[NASA-CR-180140] N87-15671
Accreting pulsars: Some recent theoretical results N87-15857
PERISUD, MONTROUGE (FRANCE).
Land mobile satellite service: Regulatory aspects N87-15379
PHILIPS TELECOMMUNICATIONS AND INFORMATION SYSTEMS, THE HAGUE (NETHERLANDS).
VECOM: A powerful local communication channel between vehicle-borne and roadside systems N87-15367
PHYSICAL SCIENCES, INC., ANDOVER, MASS.
COCHISE atmospheric nitrogen/oxygen excitation studies
[AD-A172234] N87-15667
PITTSBURGH UNIV., PA.
Radio frequency monitoring of turbine generators N87-15412
Irregular wavefronts in data-driven data-dependent computations
[AD-A171151] N87-15727
The impact on the OCLC interlibrary loan subsystem on ARL libraries N87-15900
The angular sizes of faint radio sources and their implications for cosmology N87-15930
POLISH ACADEMY OF SCIENCES, WARSAW.
Magnetospheric tails in the solar planetary system N87-15818
PORTLAND UNIV., OREG.
Tropospheric HO determination by FAGE N87-15532
Tropospheric HO2 determination by FAGE N87-15542
PRATT AND WHITNEY AIRCRAFT, EAST HARTFORD, CONN.
Creep fatigue life prediction for engine hot section materials (ISOTROPIC)
[NASA-CR-179550] N87-15491
PRATT AND WHITNEY AIRCRAFT, WEST PALM BEACH, FLA.
Breadboard RL10-11B low thrust operating mode
[NASA-CR-174914] N87-15269
Low heat transfer oxidizer heat exchanger design and analysis
[NASA-CR-179488] N87-15272
PRINCETON UNIV., N. J.
Boundary layer parameterizations and land surface processes in GFDL GCMS N87-15549
The wrap up problem of the galactic magnetic field N87-15870

R

RACAL-DECCA ADVANCED DEVELOPMENT LTD., WALTON-ON-THAMES (ENGLAND).
On-board processing payload technology for an European land mobile satellite system N87-15376
RAND CORP., SANTA MONICA, CALIF.
A comparison of single-sideband, suppressed-carrier and double-sideband, full-carrier amplitude modulation
[P-7254] N87-15394
Soviet research on the transport of intense relativistic electron beams through low-pressure air
[AD-A172274] N87-15783
READING UNIV. (ENGLAND).
Rainfall estimation over the Sahel using Meteosat thermal infra-red data N87-15587
Hydrological studies in Niger N87-15609
REDDY AND ASSOCIATES, TULLAHOMA, TENN.
A locally implicit method for fluid flow problems
[NASA-CR-178989] N87-15443
Grid generation for turbomachinery problems
[NASA-CR-178988] N87-15745
REPORT STORE, LAWRENCE, KANS.
Survey of ergonomics databases in member countries of the international ergonomics association
[AD-A171142] N87-15701
RICE UNIV., HOUSTON, TEX.
A radiative transfer study of the early terrestrial atmospheres N87-15664
Plasma outflow and superrotation in the Jovian magnetosphere deduced from Voyager observations N87-15924
The two state structure of the solar wind and its influence upon proton temperatures in the inner heliosphere. Observations of Helios 1 and Helios 2 N87-15929
RMS TECHNOLOGIES, INC., TREVOSE, PA.
Seat experiment results of full-scale transport aircraft controlled impact demonstration
[AD-A172245] N87-15193
ROCHESTER UNIV., N. Y.
A programming environment for parallel vision algorithms
[AD-A171561] N87-15739
ROCKWELL INTERNATIONAL CORP., THOUSAND OAKS, CALIF.
Fundamental aspects of heterojunction bipolar transistor technology
[AD-A171225] N87-15426
ROCKWELL INTERNATIONAL SCIENCE CENTER, THOUSAND OAKS, CALIF.
Development of upwind schemes for the Euler equations
[NASA-CR-4043] N87-15188
ROME UNIV. (ITALY).
Effects of atmospheric aerosol size distributions on the retrieval of surface spectral radiance from satellite N87-15596
ROYAL AIRCRAFT ESTABLISHMENT, FARNBOROUGH (ENGLAND).
The dynamic scaling and development of model helicopter rotor blades for the RAE 24ft wind tunnel test rig
[RAE-TR-85052] N87-15203
Fatigue crack propagation and fracture toughness of plasma arc welded Ti-6Al-4V alloy
[RAE-TR-85066] N87-15478
The characteristics of the second-order target model
[RAE-TR-85071] N87-15752
ROYAL MILITARY COLL. OF SCIENCE, SHRIVENHAM (ENGLAND).
Hydrodynamics of film cooling N87-15219
RUTHERFORD HIGH ENERGY LAB., CHILTON (ENGLAND).
Auroral electron acceleration by lower-hybrid waves
[DE86-703346] N87-15658

S

SANDIA NATIONAL LABS., ALBUQUERQUE, N. MEX.
Program to analyze the failure mode of lead-acid batteries
[NUREG-CR-4833] N87-15415
Basic equations and solution method for the calculation of the transient electromechanical response of dielectric devices
[DE86-012728] N87-15436
Control and simulation of a 3-jointed finger
[DE86-014303] N87-15469
GENESIS finite element mesh file format
[DE86-012740] N87-15735
Selective hydrogen passivation of oxygen-related thermal-donor clusters in silicon
[DE86-014718] N87-15894
SAO PAULO UNIV. (BRAZIL).
Scalar fields in Kasner-type space-times: Time dependent vacuum expectation values
[DE86-702622] N87-15896
SATEL CONSEIL, PARIS (FRANCE).
Land mobile communications satellite missions in Europe N87-15362
SCHOOL OF AEROSPACE MEDICINE, BROOKS AFB, TEX.
G-tolerance standards for aircrew training and selection
[AD-A170441] N87-15685
SCIENCE APPLICATIONS, INC., CHATSWORTH, CALIF.
Pressure interactions in supersonic combustion
[AD-A172711] N87-15289
SCIENCE RESEARCH COUNCIL, CHILTON (ENGLAND).
Land mobile satellite systems using highly eccentric orbits N87-15389
SCITRAN, INC., SANTA BARBARA, CALIF.
Study of the kinetics of catalytic decomposition of hydrazine vapors on palladium
[NASA-TM-88549] N87-15286
SHERBROOKE UNIV. (QUEBEC).
Preliminary results of anthropogenic albedo changes over the past 15 years in Eastern Canada N87-15617

SILTEC CORP., MOUNTAIN VIEW, CALIF.
Selective hydrogen passivation of oxygen-related thermal-donor clusters in silicon
[DE86-014718] N87-15894
SIMFEROPOL M. V. FRUNZE STATE UNIV. (USSR).
Rediscussion of the model atmosphere of Vega N87-15842
SIMON FRASER UNIV., BURNABY (BRITISH COLUMBIA).
Space mathematics: A resource for secondary school teachers
[NASA-EP-175] N87-15742
SIMULA, INC., PHOENIX, ARIZ.
Seat experiment results of full-scale transport aircraft controlled impact demonstration
[AD-A172245] N87-15193
SMITHSONIAN ASTROPHYSICAL OBSERVATORY, CAMBRIDGE, MASS.
Support of Mark 3 optical interferometer
[AD-A171135] N87-15788
EX56a study of extended X-ray emission around isolated galaxies EX56b identification and spectra of bright X-ray sources at high galactic latitude
[NASA-CR-180099] N87-15931
SOCIETE D'ECONOMIE ET DE MATHEMATIQUE APPLIQUEES, MONTROUGE (FRANCE).
Syntax directed editing of LeLISP. Annexe D1.A3 of deliverable D1 - second review N87-15711
Definition of common interfaces. Deliverable D2 of task T2 N87-15712
Interfaces between LISP and PROLOG. Deliverable D2.A1 of task 2 N87-15713
Specifications in natural semantics. Deliverable D4 of task T4, annex 2 N87-15718
SOUTH DAKOTA STATE UNIV., BROOKINGS.
Modeling energy flow and nutrient cycling in natural semiarid grassland ecosystems with the aid of thematic mapper data
[NASA-CR-179903] N87-15517
SOUTHWEST RESEARCH INST., SAN ANTONIO, TEX.
Development of referee fuels for improved Army multifuel engine design
[AD-A171143] N87-15318
SRI INTERNATIONAL CORP., MENLO PARK, CALIF.
Electromagnetic sensor arrays for nondestructive evaluation and robot control
[AD-A171128] N87-15474
Ultrasensitive detection of atmospheric trace gases using frequency modulation spectroscopy N87-15535
A rewrite rule machine. Programming by generic example
[AD-A171074] N87-15726
STANFORD LINEAR ACCELERATOR CENTER, CALIF.
SLAC pulsed X-ray facility
[DE86-012045] N87-15456
STANFORD UNIV., CALIF.
End-point control of flexible manipulators
[AD-A172287] N87-15471
A decentralized naming facility
[AD-A170937] N87-15725
The stationary autogressive model
[AD-A171416] N87-15753
STATE UNIV. OF NEW YORK, BINGHAMTON.
Effects of the oceans on polar motion: Extended investigations
[NASA-CR-179986] N87-15676
Effects of the oceans on polar motion: Extended investigations
[NASA-CR-180066] N87-15677
STATE UNIV. OF NEW YORK, BUFFALO.
Laser-linewidth effects on the photon-phonon conversion rate at a gas-solid interfaces
[AD-A171469] N87-15886
STATE UNIV. OF NEW YORK, STONY BROOK.
Chemistry of the outer planets: Investigations of the chemical nature of the atmosphere of Titan
[NASA-CR-180072] N87-15927
STUTTGART UNIV. (WEST GERMANY).
Thermodynamic and Flow Mechanical Problems in Aircraft and Spacecraft Drives. Summary of conference reports for 1974, 1975, 1976
[ETN-87-98750] N87-15223
A simple concept for the computation of steady supersonic flow with supply of heat N87-15224
Comparison of turboengine, turborocket, and turbojet engine as propulsion for long range and high Mach numbers N87-15225
Air breathing jet engines for satellite launcher vehicles. Analysis and comparison of suitable propulsion concepts N87-15226
Integrated turboramjet-rocket performance potential: Project ITUSTRA
[ICAS-DGLR-76-045] N87-15227
Problems of the compensation calculation for the interferometry of spatial flows N87-15228
Estimation of global, direct and diffuse radiation from satellite images by statistical methods N87-15639
SUSSEX UNIV., BRIGHTON (ENGLAND).
Identification of damping parameters of a squeeze-film bearing
[AD-A169678] N87-15470
SYDNEY UNIV. (AUSTRALIA).
Magnetospheric and solar radiation from loss-cone driven ion instabilities N87-15839
SYSTEMS SCIENCE AND SOFTWARE, LA JOLLA, CALIF.
Stress rates in continuum mechanics and computer codes
[AD-A172704] N87-15495

T

TBILISI STATE UNIV. (USSR).
The problem of the MHD flow near stagnation point of the current sheet N87-15817
Negative energy vortices in inhomogeneous plasma N87-15863
Alfven vortices in a homogeneous plasma N87-15864
Revision of the theory of gradient solitons N87-15865
TECHNICAL RESEARCH CENTRE OF FINLAND, ESPOO.
Corrosion and stress corrosion of steel pressure boundary components and steam turbines
[DE86-760555] N87-15293
TECHNION - ISRAEL INST. OF TECH., HAIFA.
Effect of cold-working by hole expansion on fatigue life of 7075-T7351 and 7475-T761 aluminum lugs with and without initial flaws under maneuver loading spectrum
[TAE-561] N87-15291
Models of cerebral system mechanics
[AD-A171483] N87-15692
TECHNION RESEARCH AND DEVELOPMENT FOUNDATION LTD., HAIFA (ISRAEL).
Durability of structural adhesively bonded systems
[AD-A170708] N87-15492
TECHNISCHE HOCHSCHULE, AACHEN (WEST GERMANY).
Automotive Spark-Ignition Engine in a New European Context. Proceedings
[DE86-753253] N87-15468
TECHNISCHE HOGESCHOOL, EINDHOVEN (NETHERLANDS).
Limit cycles in digital filters: A bibliography 1975-1984
[EUT-85-E-154] N87-15411
A theoretical study of the electromagnetic fields in a limb, excited by artificial sources
[EUT-86-E-156] N87-15694
Some asymptotic properties of multivariable models identified by equation error techniques
[EUT-85-E-153] N87-15751
The influence of a high index microlens in a laser-taper coupling
[EUT-85-E-155] N87-15792
Deviation from local thermodynamic equilibrium in a cesium-seeded argon plasma
[EUT-85-E-152] N87-15881
TECHNISCHE UNIV., BERLIN (WEST GERMANY).
Investigation of the experimental detection of boundary layer transition N87-15171
TECHNISCHE UNIV., MUNICH (WEST GERMANY).
Clear land anisotropy conversion factors: A comparison of theoretical and experimental results N87-15581
TELESAT CANADA, OTTAWA (ONTARIO).
MSAT system and service description N87-15387
TENNESSEE UNIV. SPACE INST., TULLAHOMA.
Nonlinear wave vacillation in the atmosphere
[NASA-CR-179985] N87-15659
TEXAS A&M UNIV., COLLEGE STATION.
Optimization of closed loop eigenvalues: Maneuvering, vibration control and structure/control design iteration for flexible spacecraft
[AD-A172716] N87-15263
A model for predicting thermomechanical response of large space structures
[AD-A172966] N87-15264
TEXAS TECHNOLOGICAL COLL., LUBBOCK.
Structural-mechanics behavior of insulating glass units
[PB86-234614] N87-15316
TEXAS UNIV., AUSTIN.
Maximum-terminal-velocity guidance for a hypersonic glider N87-15202
Simulation codes for calculation of heat transfer to convectively-cooled turbine blades N87-15213
On the need to benchmark simulation codes N87-15214
Simulating the effects of curvature, free stream turbulence, and transition N87-15215
Simulation codes for calculation of heat transfer to film-cooled turbine blades N87-15216
Digital simulation of the measured electrochemical response of reversible redox couples at microelectrode arrays: Consequences arising from closely spaced ultramicroelectrodes, revision
[AD-A170943] N87-15423
Simulation of two-dimensional internal incompressible separated flows with heat transfer N87-15439
Undersea volcano production versus lithospheric strength from satellite altimetry
[NASA-CR-179984] N87-15660
Research in nonlinear acoustics
[AD-A172634] N87-15777
The transformation from planetary nebula nucleus to white dwarf: A seismological study of stellar metamorphosis N87-15919
THESSALONIKI UNIV. (GREECE).
The use of remote sensing techniques in the study of vegetation recovery after fire in mediterranean countries (a preliminary study) N87-15623
TITAN SYSTEMS, INC., LA JOLLA, CALIF.
Artificial intelligence through evolutionary programming: Prediction and identification
[AD-A171544] N87-15741
TORONTO UNIV., DOWNSVIEW (ONTARIO).
The application of laser saturation to the efficient generation of short wavelength radiation from plasmas
[AD-A172945] N87-15462
TOYAMA UNIV. (JAPAN).
Explosive coalescence of current loops and particle acceleration N87-15804
Preflare acceleration by magnetic trapping in shearing arcades N87-15811
TRACOR HYDRONAUTICS, INC., LAUREL, MD.
Cloud cavitation and collective bubble dynamics
[AD-A170692] N87-15446
TROMSOE UNIV. (NORWAY).
On the influence of surface characteristics from satellite radiation measurements N87-15580
TSOLAKIDIS (COSTAS), PIRAEUS (GREECE).
Location finding using meteorological satellite images N87-15600

U

UNISEARCH ASSOCIATES, INC., CONCORD (ONTARIO).
Tunable-diode laser absorption spectrometry N87-15543
UNITED KINGDOM ATOMIC ENERGY AUTHORITY, HARWELL (ENGLAND).
Effects of stress on the ultrasonic response of fatigue cracks
[AERE-R-10654] N87-15497
UNIVERSIDAD NACIONAL AUTONOMA DE MEXICO, ENSENADA.
Models of the Venus ionospheric flow N87-15820
UNIVERSIDAD NACIONAL DE MEXICO, MEXICO CITY.
Systems approach to quantify desertifications processes using LANDSAT-MSS data N87-15613
UNIVERSIDADE TECNICA DE LISBOA (PORTUGAL).
Pulsar electrodynamics: Magnetospheres and radiation by magnetospheric plasma N87-15855
UNIVERSITE CATHOLIQUE DE LOUVAIN (BELGIUM).
Critical flows N87-15325
What can we learn from nuclear engineering safety? N87-15326
Estimation of surface albedo using satellite data. A simple formulation for atmospheric effects N87-15579
Sonic anemometer surface heat flux measurements for validation of satellite observations N87-15599
UNIVERSITE DE TECHNOLOGIE DE COMPIEGNE (FRANCE).
Errors and uncertainties in satellite derived albedo N87-15643
Estimation of atmospheric turbidity N87-15645
UNIVERSITE DES SCIENCES ET TECHNIQUES DE LILLE (FRANCE).
Solar irradiance at the Earth's surface from NOAA satellites N87-15577
Short wave radiative fluxes at surface from NOAA satellites N87-15638
UNIVERSITY COLL., DUBLIN (IRELAND).
Hydrologic models of land surface processes N87-15547
UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES.
The use of interactive voice systems to improve multiple-task performance
[AD-A171492] N87-15703
UNIVERSITY OF THE WEST INDIES, KINGSTON (JAMAICA).
Vegetation change and desertification in the Caribbean N87-15619

UTAH STATE UNIV., LOGAN.
Investigation into alternative statistical auroral oval models, stage 1
[NASA-CR-180061] N87-15656

V

VACUMETRICS, INC., VENTURA, CALIF.
A new approach to non-invasive oxygenated mixed venous PCO(sub)2
[NASA-CR-171949] N87-15682
VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG.
Optimization of closed loop eigenvalues: Maneuvering, vibration control and structure/control design iteration for flexible spacecraft
[AD-A172716] N87-15263
An interdisciplinary approach to predictive modeling of structural adhesive bonding. Characterization of Ti-6Al-4V oxides and the adhesive/oxide interphase
[AD-A172313] N87-15312
VIRGINIA UNIV., CHARLOTTESVILLE.
Investigation of the elastic behavior of Al-Li-X alloys
[AD-A171224] N87-15295
VON KARMAN INST. FOR FLUID DYNAMICS, RHODE-SAINT-GENESE (BELGIUM).
Convective Heat Transfer and Film Cooling in TurboMachinery
[VKI-LS-1986-06] N87-15208
Two Phase Flows in Major Technological Hazards, volume 1
[VKI-LS-1986-03-VOL-1] N87-15321
VRIJE UNIVERSITEIT, AMSTERDAM (NETHERLANDS).
Diagonalization methods in a polynomial setting
[FVI-86-10] N87-15750

W

WASHINGTON UNIV., SEATTLE.
Finite element analysis of propagating interface cracks in composites N87-15276
WESTINGHOUSE RESEARCH AND DEVELOPMENT CENTER, PITTSBURGH, PA.
The use of microdielectrometry in monitoring the cure of carbon-epoxy prepreg
[AD-A172504] N87-15280
WIGGINS (J. H.) CO., INC., LONG BEACH, CALIF.
Development of instrumentation to measure sound speed and flow direction in dusty flow fields
[AD-A171050] N87-15453
WISCONSIN UNIV., MADISON.
An 1 sup (p) theory for the n-dimensional, stationary, compressible, Navier-Stokes equations, and the incompressible limit for compressible fluids. The equilibrium solutions
[AD-A172778] N87-15451
Initial-boundary value problems for linear hyperbolic systems
[AD-A171527] N87-15747
WISCONSIN UNIV., MILWAUKEE.
Seventh International Summer Institute in Surface Science
[AD-A171449] N87-15287
WORLD METEOROLOGICAL ORGANIZATION, GENEVA (SWITZERLAND).
WCRP (World Climate Research Program) on Land Surface Processes and Climate: Objectives and requirements N87-15546
Global runoff data sets and use of geographic information systems N87-15570
WYLE LABS., INC., HUNTSVILLE, ALA.
Equipment concept design and development plans for microgravity science and applications research on space station: Combustion tunnel, laser diagnostic system, advanced modular furnace, integrated electronics laboratory
[NASA-CR-179535] N87-15320

X

XEROX PALO ALTO RESEARCH CENTER, CALIF.
Selective hydrogen passivation of oxygen-related thermal-donor clusters in silicon
[DE86-014718] N87-15894

Z

ZURICH UNIV. (SWITZERLAND).
Monitoring of land-surface change in Sri Lanka N87-15618

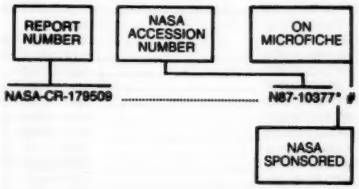
Typical Contract Number Index Listing

Listings in this index are arranged alphanumerically by contract number. Under each contract number the NASA accession numbers denoting documents that have been produced as a result of research done under that contract are arranged in ascending order. The NASA accession number denotes the number by which the citation is identified.

AF-AFOSR-0020-85 ..... N87-15462
AF-AFOSR-0050-82 ..... N87-15687
AF-AFOSR-0056-85 ..... N87-15737
AF-AFOSR-0078-86 ..... N87-15733
AF-AFOSR-0124-84 ..... N87-15290
AF-AFOSR-0169-83 ..... N87-15893
AF-AFOSR-0190-81 ..... N87-15748
AF-AFOSR-0223-84 ..... N87-15475
AF-AFOSR-0233-85 ..... N87-15692
AF-AFOSR-0326-82 ..... N87-15733
ARO-21-82 ..... N87-15404
ARO-55-81 ..... N87-15404
ARO-122-85 ..... N87-15404
ARO-123-83 ..... N87-15404
ARO-127-84 ..... N87-15404
CEC-CL.113.UK(H) N87-15564
N87-15566
DA PROJ. 1L1-61102-BH-37 ..... N87-15470
DA PROJ. 1L1-61102-BH-57 ..... N87-15492
DA PROJ. 1L7-62733-AH-20 ..... N87-15318
DA PROJ. 2Q1-61102-B-74-F N87-15698
DA-ERO-75-G001 ..... N87-15227
DAAG29-80-C-0041 ..... N87-15451
N87-15747
DAAG29-81-D-0100 ..... N87-15431
N87-15734
DAAG29-81-G-0013 ..... N87-15723
DAAG29-81-K-0060 ..... N87-15789
DAAG29-82-C-0015 ..... N87-15328
DAAG29-82-K-0029 ..... N87-15232
DAAG29-82-K-0094 ..... N87-15190
DAAG29-82-K-0123 ..... N87-15401
DAAG29-83-C-0020 ..... N87-15426
DAAG29-83-K-0054 ..... N87-15779
DAAG29-83-K-0062 ..... N87-15309
DAAG29-83-K-0089 ..... N87-15689
DAAG29-83-K-0091 ..... N87-15892
DAAG29-84-C-0028 ..... N87-15461
DAAG29-84-K-0005 ..... N87-15409
DAAG29-84-K-0058 ..... N87-15731
N87-15740
N87-15901
DAAG29-84-K-0197 ..... N87-15697
DAAG29-85-K-0001 ..... N87-15298
DAAG29-85-K-0239 ..... N87-15753
DAAG46-84-K-0002 ..... N87-15309
DAAK70-82-C-0001 ..... N87-15318
DAAK70-85-C-0007 ..... N87-15318
DAAL02-86-P-1599 ..... N87-15701
DAAL03-86-K-0094 ..... N87-15746
DACA76-85-C-0001 ..... N87-15739
DAJA45-84-C-0044 ..... N87-15470
DAJA45-84-C-0050 ..... N87-15492
DE-AC02-76CH-03073 ..... N87-15870
DE-AC02-83CH-10083 ..... N87-15521
N87-15668
DE-AC02-83ER-40105 ..... N87-15923
DE-AC03-76SF-00515 ..... N87-15456
DE-AC03-83SF-11936 ..... N87-15522
DE-AC04-76DP-00789 ..... N87-15415
N87-15436
N87-15735
N87-15785
N87-15894
DE-AC05-84OR-21400 ..... N87-15292
N87-15314
N87-15437
N87-15473
DE-AC07-76ID-01570 ..... N87-15300
DE-FG02-84ER-45116 ..... N87-15301
N87-15302
DE-FG02-85ER-45182 ..... N87-15299
DE-FG05-80ET-53088 ..... N87-15804
DE-FG44-81R4-10465 ..... N87-15523
DFG-GR-660/5-1 ..... N87-15651
DNA PROJ. W99-QMXWA N87-15880
DNA001-84-C-0441 ..... N87-15453
DNA001-85-C-0024 ..... N87-15495
DTFA03-81-C-0040 ..... N87-15193
ESA-RFQ/3-4976/84-D-JS N87-15509
ESF-016-80(D) N87-15639
ESTEC-5324/82 ..... N87-15373
ESTEC-6101/84 ..... N87-15373
ESTEC-6372/85 ..... N87-15373
FCAR-EQ-102 ..... N87-15617
FO4701-85-C-0086 ..... N87-15773
F19628-80-C-0198 ..... N87-15433
F19628-82-C-0050 ..... N87-15667
F19628-82-K-0031 ..... N87-15666
F19628-84-C-0001 ..... N87-15408
F30602-84-C-0112 ..... N87-15901
F33615-81-C-0500 ..... N87-15686
F33615-81-C-3013 ..... N87-15189
F33615-82-K-5068 ..... N87-15307
F33615-82-K-5108 ..... N87-15471
F33615-83-C-3603 ..... N87-15234
F33615-84-C-2403 ..... N87-15520
F33615-84-C-2411 ..... N87-15447
F33615-84-C-3405 ..... N87-15407
F33615-84-C-5010 ..... N87-15279
F49620-83-C-0067 ..... N87-15264
F49620-83-K-0032 ..... N87-15263
F49620-84-C-0064 ..... N87-15289
F49620-84-K-0011 ..... N87-15474
F49620-86-C-00047 ..... N87-15206
MDA903-85-C-0030 ..... N87-15783
MDA903-85-K-0180 ..... N87-15698
NAGW-788 ..... N87-15518
NAGW-863 ..... N87-15659
NAG1-306 ..... N87-15186
NAG1-334 ..... N87-15187
NAG2-181 ..... N87-15683
NAG2-389 ..... N87-15271
NAG3-503 ..... N87-15303
NAG5-145 ..... N87-15676
N87-15677
NAG5-383 ..... N87-15558
NAG5-492 ..... N87-15558
NAG5-510 ..... N87-15514
NAG5-561 ..... N87-15516
NAG5-740 ..... N87-15655
N87-15657
N87-15663
N87-15743
N87-15744
NAG5-748 ..... N87-15656
NAG5-787 ..... N87-15660
NAG8-522 ..... N87-15931
NAG9-168 ..... N87-15922
NASA ORDER H-78747B N87-15915
NASA ORDER L-85272-B N87-15234
NASW-3676 ..... N87-15679
NASW-3737 ..... N87-15268
NASW-4004 ..... N87-15235
N87-15283
N87-15286
N87-15317
N87-15416
N87-15662
N87-15695
N87-15921
NASW-4005 ..... N87-15237
N87-15285
N87-15444
N87-15704
N87-15775
NASW-4006 ..... N87-15261
N87-15284
N87-15395
N87-15525
N87-15926
NAS1-16266 ..... N87-15175
NAS1-17492 ..... N87-15188
NAS1-17551 ..... N87-15262
NAS1-17635 ..... N87-15197
NAS1-17808 ..... N87-15490
NAS1-18256 ..... N87-15490
NAS3-22902 ..... N87-15269
NAS3-23288 ..... N87-15491
NAS3-24238 ..... N87-15269
N87-15272
NAS3-24654 ..... N87-15320
NAS3-24664 ..... N87-15270
NAS5-28766 ..... N87-15517
NAS5-28767 ..... N87-15681
NAS7-918 ..... N87-15327
N87-15390
N87-15413
N87-15414
N87-15883
NAS8-27980 ..... N87-15786
NAS8-36487 ..... N87-15745
NAS8-36648 ..... N87-15443
NAS9-16703 ..... N87-15681
NAS9-17199 ..... N87-15681
NAS9-17312 ..... N87-15393
NAS9-17349 ..... N87-15391
NAS9-17501 ..... N87-15392
NAS9-17516 ..... N87-15682
NCC2-311 ..... N87-15927
NOOO14-82-C-0179 ..... N87-15703
NOOO14-83-K-0125 ..... N87-15731
NOOO14-84-K-0291 ..... N87-15425
N87-15454
NOOO14-85-C-2212 ..... N87-15788
NOOO14-85-K-0529 ..... N87-15696
NSERC-A-5252 ..... N87-15617
NSERC-A-8643 ..... N87-15617
NSF ATM-81-15713 ..... N87-15550
NSF ATM-82-14730 ..... N87-15804
NSF ATM-83-06946 ..... N87-15559
NSF ATM-83-09767 ..... N87-15558
NSF ATM-85-06648 ..... N87-15804
N87-15811
NSF CEE-81-18214 ..... N87-15316
NSF DCR-83-02391 ..... N87-15731
N87-15901
NSF ECE-85-00620 ..... N87-15316
NSF ECS-83-10698 ..... N87-15409
NSF MCS-79-27062 ..... N87-15747
NSG-5205 ..... N87-15669
N87-15670
N87-15671
N00014-75-C-0867 ..... N87-15777
N00014-76-C-0816 ..... N87-15891
N00014-80-C-0326 ..... N87-15733
N00014-80-C-0622 ..... N87-15738
N00014-80-C-0957 ..... N87-15460
N00014-81-K-0754 ..... N87-15458
N00014-82-C-0164 ..... N87-15280
N00014-82-C-0333 ..... N87-15726
N00014-82-K-0185 ..... N87-15312
N00014-82-K-0576 ..... N87-15780
N87-15887
N00014-83-C-0244 ..... N87-15446
N00014-83-C-0458 ..... N87-15690
N00014-83-C-0725 ..... N87-15909
N00014-83-K-0107 ..... N87-15296
N87-15297
N00014-83-K-0125 ..... N87-15732
N87-15740
N87-15901
N00014-83-K-0481 ..... N87-15691
N00014-84-C-0149 ..... N87-15424
N00014-84-K-0274 ..... N87-15308
N00014-84-K-0291 ..... N87-15434
N00014-84-K-0357 ..... N87-15409

N00014-84-K-0428 ..... N87-15423
N00014-84-K-05553 ..... N87-15432
N00014-85-C-0084 ..... N87-15885
N00014-85-C-0233 ..... N87-15889
N00014-85-C-0417 ..... N87-15726
N00014-85-G-0140 ..... N87-15287
N00014-85-K-0161 ..... N87-15311
N00014-85-K-0168 ..... N87-15731
N87-15901
N00014-85-K-0177 ..... N87-15890
N00014-85-K-0339 ..... N87-15727
N00014-85-K-0404 ..... N87-15928
N00014-85-K-0479 ..... N87-15791
N00014-85-K-0526 ..... N87-15295
N00014-85-K-0553 ..... N87-15427
N00014-86-F-0024 ..... N87-15778
N00014-86-K-0043 ..... N87-15886
N00014-86-K-0280 ..... N87-15494
N00039-83-K-0431 ..... N87-15725
N62269-83-M-3126 ..... N87-15684
N62269-85-C-0716 ..... N87-15207
RR0-1109 ..... N87-15460
SNSF-2.081-0.81 ..... N87-15560
SNSF-2.890.83 ..... N87-15560
SR0-2301 ..... N87-15446
W-31-109-ENG-38 ..... N87-15736
W-7405-ENG-36 ..... N87-15785
W-7405-ENG-48 ..... N87-15455
W-7405-ENG-82 ..... N87-15282
176-20-09-70 ..... N87-15528
176-20-21-70 ..... N87-15524
199-22-76-01 ..... N87-15782
310-10-62-16-00 ..... N87-15330
310-20-64-15-00 ..... N87-15338
310-20-64-50-00 ..... N87-15337
310-20-65-86-02 ..... N87-15331
310-20-65-86-06 ..... N87-15339
310-20-67-59-00 ..... N87-15332
N87-15334
N87-15335
N87-15336
310-20-67-63-00 ..... N87-15333
310-30-70-84-02 ..... N87-15342
310-30-70-84-06 ..... N87-15341
310-30-70-84-08 ..... N87-15340
310-30-71-83-02 ..... N87-15343
314-08-10-21-40 ..... N87-15353
314-08-10-21-70 ..... N87-15354
314-30-54-81-02 ..... N87-15346
314-30-63-01-02 ..... N87-15344
314-40-21-30-04 ..... N87-15350
314-40-22-12-10 ..... N87-15357
314-40-22-39-05 ..... N87-15355
314-40-22-42-01 ..... N87-15356
N87-15358
314-40-22-70-12 ..... N87-15359
314-40-41-81-12 ..... N87-15352
314-40-44-14-19 ..... N87-15351
314-40-51-36-08 ..... N87-15345
314-40-51-38-85 ..... N87-15347
314-40-56-09-02 ..... N87-15349
314-40-56-09-05 ..... N87-15348
404-00-73-02-87 ..... N87-15360
485-49-02 ..... N87-15267
505-31-03-02 ..... N87-15183
505-42-11 ..... N87-15179
505-61-01 ..... N87-15445
505-61-01-02 ..... N87-15187
505-61-51 ..... N87-15175
505-61-71-02 ..... N87-15180
505-62-21 ..... N87-15173
N87-15441
505-62-51 ..... N87-15466
505-62-81-01 ..... N87-15174
505-63-01-05 ..... N87-15490
505-63-11 ..... N87-15205
N87-15467
505-63-21-01 ..... N87-15176
505-66-01-02 ..... N87-15234
505-66-21-01 ..... N87-15722
506-43-11 ..... N87-15305
506-43-41-04 ..... N87-15177
506-51-13-02 ..... N87-15277
506-62-23 ..... N87-15262
532-06-11 ..... N87-15182
535-03-01-01 ..... N87-15186
553-12-00 ..... N87-15442
992-21-01 ..... N87-15178
N87-15185
992-21-01-90 ..... N87-15181

Typical Report Number Index Listing



Listings in this index are arranged alphanumerically by report number. The NASA accession number denotes the number by which the citation is identified. An asterisk (*) indicates that the item is a NASA report. A pound sign (#) indicates that the item is available on microfiche.

A-86015 ..... N87-15179* #
A-86207 ..... N87-15185* #
A-86399 ..... N87-15181* #
A-86417 ..... N87-15178* #
A-86427 ..... N87-15182* #
A-87018 ..... N87-15445* #

AAMRL-TR-86-020-VOL-2 ..... N87-15686 #
AAMRL-TR-86-034 ..... N87-15699 #

AD-A169493 ..... N87-15723 #
AD-A169598 ..... N87-15254 #
AD-A169656 ..... N87-15417 #
AD-A169659 ..... N87-15724 #
AD-A169663 ..... N87-15396 #
AD-A169666 ..... N87-15680 #
AD-A169674 ..... N87-15684 #
AD-A169678 ..... N87-15470 #
AD-A169867 ..... N87-15192 #
AD-A170220 ..... N87-15418 #
AD-A170440 ..... N87-15672 #
AD-A170441 ..... N87-15685 #
AD-A170692 ..... N87-15446 #
AD-A170708 ..... N87-15492 #
AD-A170935 ..... N87-15737 #
AD-A170936 ..... N87-15229 #
AD-A170937 ..... N87-15725 #
AD-A170943 ..... N87-15423 #
AD-A170945 ..... N87-15397 #
AD-A170946 ..... N87-15294 #
AD-A170947 ..... N87-15928 #
AD-A170953 ..... N87-15686 #
AD-A171050 ..... N87-15453 #
AD-A171056 ..... N87-15493 #
AD-A171063 ..... N87-15398 #
AD-A171067 ..... N87-15885 #
AD-A171074 ..... N87-15726 #
AD-A171075 ..... N87-15189 #
AD-A171076 ..... N87-15687 #
AD-A171128 ..... N87-15474 #
AD-A171131 ..... N87-15424 #
AD-A171132 ..... N87-15274 #
AD-A171133 ..... N87-15773 #
AD-A171135 ..... N87-15788 #
AD-A171142 ..... N87-15701 #
AD-A171143 ..... N87-15318 #
AD-A171145 ..... N87-15909 #
AD-A171147 ..... N87-15400 #
AD-A171148 ..... N87-15696 #
AD-A171151 ..... N87-15727 #
AD-A171153 ..... N87-15306 #
AD-A171165 ..... N87-15206 #
AD-A171168 ..... N87-15457 #
AD-A171169 ..... N87-15447 #
AD-A171174 ..... N87-15458 #
AD-A171176 ..... N87-15746 #
AD-A171177 ..... N87-15697 #
AD-A171178 ..... N87-15789 #
AD-A171180 ..... N87-15454 #
AD-A171181 ..... N87-15425 #
AD-A171188 ..... N87-15520 #
AD-A171217 ..... N87-15401 #
AD-A171220 ..... N87-15776 #
AD-A171221 ..... N87-15307 #
AD-A171224 ..... N87-15295 #
AD-A171225 ..... N87-15426 #
AD-A171232 ..... N87-15779 #
AD-A171272 ..... N87-15427 #
AD-A171274 ..... N87-15308 #
AD-A171276 ..... N87-15255 #
AD-A171277 ..... N87-15702 #
AD-A171280 ..... N87-15728 #
AD-A171285 ..... N87-15729 #
AD-A171287 ..... N87-15402 #
AD-A171288 ..... N87-15673 #
AD-A171289 ..... N87-15688 #
AD-A171316 ..... N87-15689 #
AD-A171329 ..... N87-15278 #
AD-A171330 ..... N87-15690 #
AD-A171333 ..... N87-15190 #
AD-A171348 ..... N87-15691 #
AD-A171350 ..... N87-15666 #
AD-A171393 ..... N87-15730 #
AD-A171409 ..... N87-15309 #
AD-A171410 ..... N87-15328 #
AD-A171416 ..... N87-15753 #
AD-A171427 ..... N87-15901 #
AD-A171431 ..... N87-15403 #
AD-A171449 ..... N87-15287 #
AD-A171461 ..... N87-15448 #
AD-A171462 ..... N87-15191 #
AD-A171469 ..... N87-15886 #
AD-A171473 ..... N87-15238 #
AD-A171480 ..... N87-15303* #
AD-A171483 ..... N87-15692 #
AD-A171492 ..... N87-15703 #
AD-A171505 ..... N87-15731 #
AD-A171508 ..... N87-15449 #
AD-A171518 ..... N87-15887 #
AD-A171525 ..... N87-15902 #
AD-A171526 ..... N87-15704 #
AD-A171527 ..... N87-15747 #
AD-A171536 ..... N87-15732 #
AD-A171539 ..... N87-15889 #
AD-A171544 ..... N87-15741 #
AD-A171546 ..... N87-15738 #
AD-A171551 ..... N87-15698 #
AD-A171552 ..... N87-15733 #
AD-A171561 ..... N87-15739 #
AD-A171564 ..... N87-15310 #
AD-A171567 ..... N87-15430 #
AD-A171575 ..... N87-15734 #
AD-A171577 ..... N87-15319 #
AD-A171587 ..... N87-15780 #
AD-A171610 ..... N87-15431 #
AD-A172222 ..... N87-15693 #
AD-A172223 ..... N87-15405 #
AD-A172224 ..... N87-15740 #
AD-A172225 ..... N87-15406 #
AD-A172226 ..... N87-15674 #
AD-A172227 ..... N87-15878 #
AD-A172228 ..... N87-15879 #
AD-A172230 ..... N87-15790 #
AD-A172231 ..... N87-15459 #
AD-A172234 ..... N87-15667 #
AD-A172236 ..... N87-15279 #
AD-A172238 ..... N87-15890 #
AD-A172242 ..... N87-15296 #
AD-A172245 ..... N87-15193 #
AD-A172248 ..... N87-15297 #
AD-A172253 ..... N87-15748 #
AD-A172256 ..... N87-15194 #
AD-A172258 ..... N87-15494 #
AD-A172274 ..... N87-15783 #
AD-A172275 ..... N87-15265 #
AD-A172276 ..... N87-15257 #
AD-A172283 ..... N87-15311 #
AD-A172287 ..... N87-15471 #
AD-A172304 ..... N87-15280 #
AD-A172313 ..... N87-15312 #
AD-A172322 ..... N87-15230 #
AD-A172361 ..... N87-15313 #
AD-A172362 ..... N87-15791 #
AD-A172374 ..... N87-15699 #
AD-A172375 ..... N87-15774 #
AD-A172376 ..... N87-15231 #
AD-A172379 ..... N87-15910 #
AD-A172400 ..... N87-15207 #
AD-A172404 ..... N87-15911 #
AD-A172409 ..... N87-15450 #
AD-A172563 ..... N87-15432 #
AD-A172631 ..... N87-15433 #
AD-A172634 ..... N87-15777 #
AD-A172648 ..... N87-15407 #
AD-A172649 ..... N87-15880 #
AD-A172650 ..... N87-15903 #
AD-A172659 ..... N87-15891 #
AD-A172660 ..... N87-15460 #
AD-A172687 ..... N87-15475 #
AD-A172691 ..... N87-15892 #
AD-A172692 ..... N87-15893 #
AD-A172694 ..... N87-15281 #
AD-A172704 ..... N87-15495 #
AD-A172705 ..... N87-15298 #
AD-A172708 ..... N87-15408 #
AD-A172709 ..... N87-15434 #
AD-A172711 ..... N87-15289 #
AD-A172716 ..... N87-15263 #
AD-A172719 ..... N87-15749 #
AD-A172726 ..... N87-15778 #
AD-A172757 ..... N87-15409 #
AD-A172778 ..... N87-15451 #
AD-A172933 ..... N87-15461 #
AD-A172934 ..... N87-15290 #
AD-A172945 ..... N87-15462 #
AD-A172965 ..... N87-15232 #
AD-A172966 ..... N87-15264 #
AD-A172974 ..... N87-15463 #

AD-D012426 ..... N87-15877 #
AD-D012427 ..... N87-15419 #
AD-D012436 ..... N87-15420 #
AD-D012439 ..... N87-15787 #
AD-D012443 ..... N87-15273 #
AD-D012444 ..... N87-15421 #
AD-D012445 ..... N87-15422 #
AD-D012446 ..... N87-15399 #
AD-D012448 ..... N87-15428 #
AD-D012453 ..... N87-15288 #
AD-D012462 ..... N87-15888 #
AD-D012463 ..... N87-15199 #
AD-D012464 ..... N87-15429 #

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C-731 ..... N87-15690 #

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DE86-012728 ..... N87-15436 #
DE86-012740 ..... N87-15735 #
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DE86-013757 ..... N87-15521 #
DE86-014161 ..... N87-15522 #
DE86-014303 ..... N87-15469 #
DE86-014339 ..... N87-15314 #
DE86-014348 ..... N87-15299 #
DE86-014417 ..... N87-15437 #
DE86-014718 ..... N87-15894 #
DE86-014830 ..... N87-15923 #
DE86-014917 ..... N87-15300 #
DE86-015180 ..... N87-15473 #
DE86-015463 ..... N87-15523 #
DE86-015729 ..... N87-15301 #
DE86-015730 ..... N87-15302 #
DE86-015768 ..... N87-15282 #
DE86-700263 ..... N87-15784 #
DE86-702620 ..... N87-15895 #
DE86-702622 ..... N87-15896 #
DE86-702874 ..... N87-15897 #
DE86-703346 ..... N87-15658 #
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E-3216 ..... N87-15466* #
E-3253 ..... N87-15467* #
E-3326 ..... N87-15305* #
E-3348 ..... N87-15442* #
E-3356 ..... N87-15441* #

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ESA-SP-251 ..... N87-15793 #
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ETN-86-98711 ..... N87-15792 #
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GPO-61-975 ..... N87-15904 #
GPO-64-295 ..... N87-15256 #
GPO-64-491 ..... N87-15515 #
GPO-64-526 ..... N87-15905 #

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IC-85/260 ..... N87-15897 #

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IFSM-86-143 ..... N87-15297 #

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IT-2 ..... N87-15392* #

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L-15975 ..... N87-15183* #
L-16097 ..... N87-15184* #
L-16126 ..... N87-15524* #
L-16151 ..... N87-15174* #
L-16152 ..... N87-15277* #
L-16161 ..... N87-15180* #
L-16216 ..... N87-15528* #

LIDS-TH-1557 ..... N87-15409 #

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NADC-88071-60 ..... N87-15294 #

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NAS 1.15:87638 ..... N87-15722* #
NAS 1.15:87718 ..... N87-15524* #
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NAS 1.15:88000 ..... N87-15395* #
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NAS 1.15:88356 ..... N87-15181* #
NAS 1.15:88364 ..... N87-15178* #
NAS 1.15:88373 ..... N87-15182* #
NAS 1.15:88450 ..... N87-15283* #
NAS 1.15:88451 ..... N87-15284* #
NAS 1.15:88473 ..... N87-15416* #
NAS 1.15:88475 ..... N87-15525* #
NAS 1.15:88476 ..... N87-15285* #
NAS 1.15:88477 ..... N87-15662* #
NAS 1.15:88479 ..... N87-15695* #
NAS 1.15:88484 ..... N87-15921* #
NAS 1.15:88487 ..... N87-15444* #
NAS 1.15:88495 ..... N87-15926* #
NAS 1.15:88499 ..... N87-15261* #
NAS 1.15:88513 ..... N87-15237* #
NAS 1.15:88514 ..... N87-15704* #
NAS 1.15:88523 ..... N87-15236* #
NAS 1.15:88530 ..... N87-15235* #
NAS 1.15:88535 ..... N87-15775* #
NAS 1.15:88548 ..... N87-15317* #
NAS 1.15:88549 ..... N87-15286* #
NAS 1.15:88824 ..... N87-15267* #
NAS 1.15:88831 ..... N87-15173* #
NAS 1.15:88862 ..... N87-15466* #
NAS 1.15:88875 ..... N87-15467* #
NAS 1.15:88902 ..... N87-15305* #
NAS 1.15:88919 ..... N87-15442* #
NAS 1.15:88923 ..... N87-15441* #
NAS 1.15:88997 ..... N87-15277* #
NAS 1.15:89014 ..... N87-15176* #
NAS 1.15:89020 ..... N87-15180* #
NAS 1.15:89046 ..... N87-15177* #
NAS 1.15:89054 ..... N87-15782* #
NAS 1.15:89077 ..... N87-15205* #
NAS 1.15:89408 ..... N87-15445* #
NAS 1.15:89604 ..... N87-15678* #
NAS 1.19:175 ..... N87-15742* #
NAS 1.21:7046(15) N87-15239*
NAS 1.26:3922(10) ..... N87-15679* #
NAS 1.26:4031 ..... N87-15175* #
NAS 1.26:4039 ..... N87-15262* #
NAS 1.26:4042 ..... N87-15187* #
NAS 1.26:4043 ..... N87-15188* #
NAS 1.26:4044 ..... N87-15186* #
NAS 1.26:171946 ..... N87-15681* #
NAS 1.26:171948 ..... N87-15391* #
NAS 1.26:171949 ..... N87-15682* #
NAS 1.26:171950 ..... N87-15392* #
NAS 1.26:171951 ..... N87-15393* #
NAS 1.26:174914 ..... N87-15269* #
NAS 1.26:175101 ..... N87-15303* #
NAS 1.26:177077 ..... N87-15514* #
NAS 1.26:178093 ..... N87-15197* #
NAS 1.26:178186 ..... N87-15490* #
NAS 1.26:178188-VOL-1 ..... N87-15234* #
NAS 1.26:178986 ..... N87-15915* #
NAS 1.26:178988 ..... N87-15745* #
NAS 1.26:178989 ..... N87-15443* #
NAS 1.26:178993 ..... N87-15268* #
NAS 1.26:179488 ..... N87-15272* #
NAS 1.26:179502 ..... N87-15270* #
NAS 1.26:179535 ..... N87-15320* #
NAS 1.26:179550 ..... N87-15491* #
NAS 1.26:179903 ..... N87-15517* #
NAS 1.26:179917 ..... N87-15669* #
NAS 1.26:179938 ..... N87-15329* #
NAS 1.26:179984 ..... N87-15660* #
NAS 1.26:179985 ..... N87-15659* #
NAS 1.26:179986 ..... N87-15676* #
NAS 1.26:179988 ..... N87-15670* #
NAS 1.26:179989 ..... N87-15516* #
NAS 1.26:180058 ..... N87-15657* #
NAS 1.26:180059 ..... N87-15655* #
NAS 1.26:180060 ..... N87-15744* #
NAS 1.26:180061 ..... N87-15656* #
NAS 1.26:180062 ..... N87-15743* #
NAS 1.26:180066 ..... N87-15677* #
NAS 1.26:180069 ..... N87-15661* #
NAS 1.26:180070 ..... N87-15663* #
NAS 1.26:180071 ..... N87-15922* #
NAS 1.26:180072 ..... N87-15927* #
NAS 1.26:180095 ..... N87-15683* #
NAS 1.26:180097 ..... N87-15518* #
NAS 1.26:180098 ..... N87-15271* #
NAS 1.26:180099 ..... N87-15931* #
NAS 1.26:180140 ..... N87-15671* #
NAS 1.55:2448 ..... N87-15528* #
NAS 1.60:2523 ..... N87-15183* #
NAS 1.60:2642 ..... N87-15184* #
NAS 1.60:2653 ..... N87-15174* #
NAS 1.71:ARC-11643-1-SB ..... N87-15275* #
NAS 1.71:ARC-11646-1 ..... N87-15253* #
NAS 1.71:LAR-13411-1 ..... N87-15259* #
NAS 1.71:LAR-13435-1 ..... N87-15464* #
NAS 1.71:LEW-14297-1 ..... N87-15452* #
NAS 1.71:MFS-29207-1 ..... N87-15786* #
NAS 1.71:MSC-20761-1 ..... N87-15465* #
NAS 1.71:MSC-20985-1 ..... N87-15260* #
NAS 1.71:NPO-16607-1 ..... N87-15883* #
NAS 1.71:NPO-16632-1-CU ..... N87-15390* #
NAS 1.71:NPO-16764-1 ..... N87-15414* #
NAS 1.71:NPO-16901-1-CU ..... N87-15327* #
NAS 1.71:NPO-16932-1 ..... N87-15413* #

NASA-CASE-ARC-11429-4 ..... N87-15304*
NASA-CASE-ARC-11643-1-SB ..... N87-15275* #
NASA-CASE-ARC-11648-1 ..... N87-15253* #

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NASA-CASE-LAR-13435-1 ..... N87-15464* #

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NASA-CASE-NPO-16632-1-CU ..... N87-15390* #
NASA-CASE-NPO-16764-1 ..... N87-15414* #
NASA-CASE-NPO-16901-1-CU ..... N87-15327* #
NASA-CASE-NPO-16932-1 ..... N87-15413* #

NASA-CP-2448 ..... N87-15528* #

NASA-CR-3922(10) ..... N87-15679* #
NASA-CR-4031 ..... N87-15175* #
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NASA-TM-88451 ..... N87-15284* #
NASA-TM-88473 ..... N87-15416* #
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NASA-TM-88476 ..... N87-15285* #
NASA-TM-88477 ..... N87-15662* #
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NASA-TM-88484 ..... N87-15921* #
NASA-TM-88487 ..... N87-15444* #
NASA-TM-88495 ..... N87-15926* #
NASA-TM-88499 ..... N87-15261* #
NASA-TM-88513 ..... N87-15237* #
NASA-TM-88514 ..... N87-15704* #
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NASA-TM-88530 ..... N87-15235* #
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NASA-TM-88548 ..... N87-15317* #
NASA-TM-88549 ..... N87-15286* #
NASA-TM-88824 ..... N87-15267* #
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NASA-TM-88862 ..... N87-15466* #
NASA-TM-88875 ..... N87-15467* #
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NASA-TM-88923 ..... N87-15441* #
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NASA-TM-89077 ..... N87-15205* #
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NASA-TM-89604 ..... N87-15678* #

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NASA-TP-2642 ..... N87-15184* #
NASA-TP-2653 ..... N87-15174* #

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NRL-MR-5815 ..... N87-15878 #
NRL-MR-5816 ..... N87-15790 #
NRL-MR-5832 ..... N87-15229 #
NRL-MR-5833 ..... N87-15379 #

NRL-8968 ..... N87-15724 #
NRL-8972 ..... N87-15674 #
NRL-8984 ..... N87-15396 #

NSWC/MP-86-845 ..... N87-15430 #

NTIA-86-197 ..... N87-15410 #

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NTSB-AAB-86-21 ..... N87-15195 #

NUREG-CR-4833 ..... N87-15415 #

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ORNL/SUB-84-9009/2 ..... N87-15314 #

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P-7254 ..... N87-15394 #

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PB86-234622 ..... N87-15675 #
PB86-238755 ..... N87-15410 #
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PB86-916921 ..... N87-15195 #

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SAND-86-0910 ..... N87-15735 #
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SAND-86-7080 ..... N87-15415 #

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SAPR-2 ..... N87-15661* #

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SLAC-PUB-3968 ..... N87-15456 #

SR-2 ..... N87-15692 #

SSS-R-86-7887 ..... N87-15495 #

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TAE-561 ..... N87-15291 #

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TR-5 ..... N87-15308 #
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TR-9-ONR ..... N87-15427 #
TR-10-ONR ..... N87-15454 #
TR-12 ..... N87-15886 #
TR-12-ONR ..... N87-15434 #
TR-14 ..... N87-15432 #
TR-17 ..... N87-15753 #
TR-18 ..... N87-15296 #
TR-19 ..... N87-15297 #
TR-26 ..... N87-15887 #
TR-27 ..... N87-15780 #
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US-PATENT-CLASS-525-282 ..... N87-15304*

US-PATENT-4,597,631 ..... N87-15428 #
US-PATENT-4,597,666 ..... N87-15288 #
US-PATENT-4,612,072 ..... N87-15882*
US-PATENT-4,618,652 ..... N87-15304*

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